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TEACHER LANGUAGE TOWARDS COMPUTER-BASED TECHNOLOGY

BY

JOHN P. EWING

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Teacher Language Toward Computer-Based Technology submitted by John P. Ewing in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

This action research dissertation examines questions drawn from teachers' narratives arising from the use of computer-based technology in teaching practice. The teacher narratives were organized using Schwab's tables of four common places: learner, teacher, subject, and milieu. Four key questions emerged from the research: 1.) Does computer-based technology shape the learner? 2.) Does computer-based technology shape the teacher? 3.) Does computer-based technology shape the subject? and, 4.) Does computer-based technology shape the milieu.

The research found computer-based technology shapes all four common places. In the research, teachers pointed to a variety of changes in handling subject areas, dealing with classroom management, and changes in student/teacher roles. Teachers spoke of becoming mediators of learning rather than mere disseminators of information. To some this prospect was threatening to the role of the teacher, while others accommodated to change by shifting teaching styles to meet the challenge. Student roles also changed as students became experts, problem solvers, and mentors to other students. Finally, teachers indicated they were being challenged to understand how the new world of multimedia, World-Wide-Web communications, and access to subject resource materials were changing the classroom.

The format of the research is organized into two parts: part one includes chapters one to eight and is focused on the process of coming to the central question. Part one contains a summary of the research, an exegesis of the key terms used in the research, an historical/hermeneutic examination of coming to the question, an overview of the basis of theory that shaped the methodology and concludes with a section on the purpose of the study. Part two begins with an account of the shift in direction of the research, and reexamines the effect such a shift had on the methodology and data. Part two also contains a compilation of teacher narratives which are organized into various themes and concludes with the findings of the research and questions for future consideration. The research also contains a CDROM formatted version which contains extensive appendices and provides a hypertext linked journey through this dissertation and direct links to the World Wide Web.

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ABBREVIATIONS AND VOCABULARY

CD-ROM DISC	Is a **C**ompact **D**isk that functions as **R**ead **O**nly **M**emory. A common CD-ROM disc can store around 600 MB of data.
CD-ROM DRIVE	A device that reads the information stored on computer discs.
CD-R DRIVE	**C**ompact **D**isc **R**ecordable **D**rive is a device that allows you to permanently store information on a compact disk.
CD-RW DRIVE	A **C**ompact **D**isc-**R**e-**W**riteable Drive is similar to a CD-R drive, but allows you to change the data you record on a disc many times. A CD-RW disk stores the same amount of data as a CD-R disc.
CMC	**C**omputer-**M**ediated **C**ommunication is using computer-based technology to communicate from one computer site to another. Communication can range from the exchange of email, to verbal/audio communications via computer lines or even full scale video conferencing, or a combination of all three.
DVD ROM DRIVE	A drive that reads DVD-ROM or CD-ROM Discs. The Discs can hold enormous amounts of data from 5 GB to 17 GB of information.
CMI	**C**omputer **M**ediated (**M**anaged) **I**nstruction. Computer mediated (managed) instruction uses computer systems to present specific materials for the learner to acquire. Such systems provide students with step by step instructions as students' progress through the system as created by the designer of the system. Such systems create test materials and track student progress.
CBT	**C**omputer-**B**ased **T**echnology. CBT is technology related to computers. This includes the software, and the hardware of single, stand alone computers, and also computers that are linked together in a LAN (Local Area Network). CBT also includes computers linked over longer distances such as WAN (Wide Area Networks) and also computers connected to each other over the internet.
DISTANCE EDUCATION	Distance Education is an educational program of studies delivered over a geographical distance using video and text communication transmissions, computer-based technology, or some other technology capable of transferring course content over great distances. In Distance Education, students and teachers are linked over the distance through service providers.

DOS	**D**isk **O**perating **S**ystem Disk Operating System is a set of computer codes that allow direct the computer to carry out specific functions relating to the operation of the machine.
DVI	**D**igital **V**ideo **I**nteractive. Video recordings in digital form that allow back and forth dialog between the user and a computer. This form is found in interactive CDROM formats where the user is able to input commands or information relating to specific video productions.
EMAIL	**E**lectronic **Mail**—is a convenient way to exchange information from one party to another using computer-based technology to link the two sites.
EXEGESIS	Exegesis is the critical interpretation or explanation of written materials.
HERMENEUTICS	The science and methodology of interpretation. In this dissertation, the term describes a process in which teachers examine practical issues found in teaching through reflective.
HTML	**H**yper-**T**extual **M**arkup **L**anguage is a computer code format used to create Web pages for use on the internet.
HYPER-LINK	An electronic cross-reference used to connect computer-based text, sound, video and graphics.
HYPER-TEXT	Computer-based text that is connected to other computer-based text through a system of electronic cross-references to help users gain access to related information.
ICON	A picture (graphical user interface—GUI) on a screen representing a an object such as a document, program, folder. The icon can also be used as link to input specific commands into the computer.
INTERNET	A decentralized, global system of interconnected computer networks, used for electronic mail, on-line discussion, information retrieval, and other computer-based services including video conferencing, and cyber-business.
JAVA	Java is a complex programming language that allows users to create enhanced Web pages that include animations, moving text, playing of music, and much more.
LAN	**L**ocal **A**rea **N**etwork—A system that links together electronic office equipment, such as computers, and forms a network within a specified area. (See also **WAN**)

COMPUTER LANGUAGE	A system of symbols and rules used for communication with or between computers.
LANGUAGE	The use by human beings of voice sounds. Language also includes the symbols used in representing these sounds and is found in various combinations and patterns which are used to express and communicate thoughts, insights, and feelings. The use of this term in this study is defined in Chapter Two.
MILIEU	An environment or setting in a classroom.
MUD	A special type of CMC (Computer Mediated Communication) environment known as a **M**ultiple **U**ser **D**imension,. MUD, is a form of "virtual reality" designed to produce a structured world--structured both in the sense that it contains structures (like buildings), and that it provides structure for human behaviour.
MOO	**M**ud **O**bject-**O**rientated can be described as a computer-text-based virtual reality environment. A MOO differs from an image-based virtual reality environment in that in a MOO the virtual reality is created by participants who use text descriptions of their character and create and interact with specific rules that govern behaviour and the layout of the virtual community environment. It is similar to a novel, only the characters move and interact in a collaboratively created environment. The characters move in real time and connect together using the World Wide Web.
NARRATIVE	A story related to a specific occasion or practice.
NODES	A terminal in a computer network
OS	**O**perating **S**ystem—Software that controls the hardware and application programs of a specific computer system.
TCP/IP	Transmission Control Protocol/Internet Protocol is a language of communication on the Internet so that one computer can send information over the internet to another computer site. TCP/IP controls and divides the information so that it can be sent in smaller sizes called packets. The packets travel independently over the Internet and may take different paths to arrive at the intended destination.
URL	**U**niform **R**esource **L**ocator. URL is the address given to a specific Web page on the WWW.

WAN	Wide Area Networks A communications network that covers a wide geographical area such as a province or country. A LAN (Local Area Network) is contained in a building, and a MAN (Metropolitan Area Network) generally covers a city, town, or suburb.
WEB	The Web consists of a huge collection of documents stored on computers around the world.
WEB PAGE	A web page is a document found on the Web. Web pages can include text, pictures, sounds, and video.
WEB SITE	A web site is a collection of Web pages maintained by a college, university, government agency, company, or individual. The Web site provides information relevant to the creator of the site.
WINDOWS	Is the most widely used operating system for personal computers. Windows provides a Graphical User Interface (GUI) and desktop environment.
WWW	World Wide Web

READING ACTION RESEARCH

The following dissertation is action research. The dissertation requires an understanding of the methodology employed in action research in order for the reader to progress through the writing in a more informed way. Common to action-research is the following cycle of planning, acting, observing, and reflecting.

- **Planning** in which the participants of the research project come together to discuss identified problems which they wish to address.
- **Acting** in which the participants construct and carry out a plan to address the problem that has been identified.
- **Observing** in which the participants examine and collect data on how the plan is working.
- **Reflecting** in which the participants reflect upon what they have observed and make sense of what is being observed. In the observations the participants are to note changes and then record these changes. Reflection is supported through a collaborative effort in which the participants discuss the findings and bring up new questions that arise out of the first cycle. The process is then repeated with a new revised plan placed before the participants. The cycle continues until the problem is addressed. **(Adapted from the work by Dr.Terry Carson on Action Research at the University of Alberta.)**

This dissertation differs from other writing styles followed in dissertations as it departs from the usual historical linear progression—from one period of time to another. Instead, the organization of this dissertation reflects the cycles of hermeneutic inquiry that is prevalent in this type of research.

For example, the reader may find that at times the writing appears to repeat itself as in the discussion found in Chapter Two on the term "language." In a conventional format the term "language" would be defined and then the research would progress with a specific notion of the term being used in the research. But as expressed in Chapter Two the term "language" is not static, but continues to evolve as the research continued through cycles of reflective practice. Thus Chapter Two is a record of both the initial point of inquiry about the term, and is also a record of the hermeneutic process that shaped the term with new meanings. Consequently, Chapter Two is not a beginning chapter in the same sense of a conventional writing format, but actually reflects a picture in time of an ongoing process which is not completed even at the end of this dissertation.

While the research project shadows a linear progression of time, its organization is established upon the cycles of hermeneutic. The writing reflects the hermeneutic process of cycles of planning, acting, observing, and reflecting on the action. As meanings evolve from collaboration with peers in the field, new understandings of the terms emerge, and each cycle presents new ways of thinking about previous terms. Finally, if the reader will keep in mind that the dissertation is not written in a chronological order, but an unfolding of meanings, the reader will be able to follow the process of hermeneutic inquiry that is the foundation of this dissertation.

CHAPTER ONE

OVERVIEW AND SUMMARY OF THE RESEARCH

The following chapter establishes the context in which the central questions evolved. The chapter provides a record of debate that presents different views on the subject of introducing computer-based technology in teaching practice. The debate establishes the need for teachers to address concerns that are related to computer-based technology both generally in the field of education and specifically in personal daily practice. Finally, the chapter establishes the process of reflective hermeneutic practice to initiate questions in pursuit of further knowledge in the field that is used in this dissertation.

* * *

The following research project comes from my interest in understanding computer-based-learning in the context of my daily teaching practice as an educator. My initial interest came from my interaction with fellow teachers as we were involved a number of meetings in which our input was used in developing software for educational purposes in social studies. From these interactions with fellow teachers in the development of educational software projects, I began to have a sense that educators had specific questions that needed to be addressed as they developed and thought through how they could incorporate computer technology into their daily lesson plans. It was interesting to share what our initial beliefs and assumptions about computer-based learning were and to later review how our initial beliefs were shaped through dialogue and the further pursuit of concerns facing each teacher in the context of his or her teaching practice. Many of our questions not only looked at how we could bring this technology into our classrooms, but also whether we needed to in order to accomplish our educational goals for our students. There is no doubt that differing views exist. While writers like Rauch see the inevitable, that "the role of the teacher must change," and that the view of the teacher and the student must also be shaped to accommodate a computer-based technology of instruction, it is the purpose of my inquiry to provide a path for teachers to question that change.

Computers are not a threat to the teacher (although the role of the teacher

> must change when using them), but computers may threaten the chalkboard. Computer technologies allow professionals to share with students tools that we use daily. Further, as educators, we can provide guidance to help students develop meaningful ways to construct their own knowledge, much as we ourselves do. (Rauch, 1995)

My initial inquiry brought me along a path in which through personal observation, readings, and reflection on my practice helped me examine my teaching practice. I was able to arrive at a better understanding of the needs of my students, as well as developing a sense of the purpose of using computers in my classroom and moving beyond my initial belief that the computer was merely a "time filler"--a play toy? While "game-type learning activities" has been identified as one of many learner outcomes in a Saskatchewan Instructional Development and Research Unit (SIDRU) for the Saskatchewan School Trustees Association on Computer-Based Technology in the Classroom to "reinforce verbal, mathematical, and general skills such as making visual discriminations," (SIDRU Report, 1995) it is also important to realize that teachers must weigh the purpose and usefulness of students using a computer-based technology to monitor the effectiveness of the system in the context of yearly learner outcomes. I also explored the sense of what skills my students needed to use the computer effectively and what skills the computer developed in my students that were transferable to other areas of their academic lives. I also spent time on looking at the responsibility of educators to understand the implications of introducing computer based technology into the classroom--what would it mean in terms of pedagogical relationships, teaching styles, etc. At this junction, it is important to state that coming to the question involved a subject orientation to my question. How can I use computers in my classroom? The question also evolved into a methodology that could be used to pursue knowledge related to the subject. As time continued, I found myself developing skills that would frame not merely my subject area, but the process of acquiring the information I sought and the process in which information was acted upon and applied in my teaching practice.

The research spans a number of years of teaching experiences. At the onset of the research, seeing computers in the classroom was new and at the cutting edge of educational change. What amazes me is, in the six years since my initial interest, how quickly technology has changed. When I started there was little talk of the Internet, email, personal web sites, or distant education through such programs as Cyber- High. Those concepts were for the future and, at the time, neither government policy makers, schools administrators, nor teachers had any sense that computers in the classroom would be encouraged so quickly. Today, interactive technologies are increasing exponentially

and in effect calling teachers to examine the growing trend.

Yet as I interact with other educators I find that many of the same questions I began my inquiry are still relevant to this day. To my amazement I am discovering that few of these questions are being addressed. Almost like a stream that is forever growing, teachers feel a pressure to conform without having their concerns addressed. I am perplexed to why they are not being addressed. In the Saskatchewan Instructional Development and Research Unit (SIDRU) for the Saskatchewan School Trustees Association, Carr's work in Distinguishing systemic from systematic. *Techtrends*, *41*(1), 16-20 is quoted draws the importance of addressing the concerns of the stakeholders--in this case teachers.

> The complexity and uniqueness of each community require that change facilitators adopt a process of planning and implementation that is open to collaboration with stakeholders. Without such participation, research findings suggest that change efforts have little hope of continuing success. (Carr, as quoted in the SIRDU REPORT, 1996)

Thus, coming to a question has been a process for me. As I have attended numerous inservices on integrating computer-based-learning into my daily practice, I am still finding important questions that many educators are still not having addressed. Perhaps it is because there is an assumption among many that technology is "user-friendly," "a necessity to the learned person," and everyone can see how important it is in the scheme of learning; therefore, teachers are asked to embrace the "way" rather than having opportunity to address the concerns they have as knowledgeable participants in education. Steve Cameron's comments support the introduction of computer-based technology into the classroom even though he calls upon teachers to proceed with caution. For Cameron, and other educators, computer-based technology is the way for the future--teachers need to grasp hold of this "way" or fail to meet the needs of their students.

> In many ways, computers are the ideal teacher. Unlike their human colleagues, computers are never too harried to answer a question, never too distracted to notice that a student is puzzled. They always proceed at each child's own pace, presenting information in a variety of ways until students show that they understand the material. The best computerized tutors can capture and hold a child's attention for hours. (Cameron, 1997)

While I am not opposed to Cameron's enthusiasm for change, I still believe

teachers need to be afforded a process in which they may contribute to what they see as a place for computer-based technology in their own work. The development of a "teacher" language that reflects personal daily teaching practice allows the teacher to address the questions that confront them at different times in their careers. As new questions develop they will unfold a knowledge that is essential to developing a pedagogical understanding and context to bring technology into the daily routines of educators.

This research is a narrative about such a process. The goal of the research is to help teachers ask and explore questions that will help them become better educators through reflective practice. At the same time, the research intends to help the reader of this thesis engage in the same process of asking important and pertinent questions as educators push the boundaries of what is known about the pedagogical influences that computer technology will bring to us as teachers. The questions will reflect strategies used to incorporate computers into the classroom. They will provide room to examine action as it is carried out and observed in the classroom; the questions will examine the nature of reflection as it also relates to the teacher's understanding of the various aspects of curriculum in daily practice and as it relates to what Schubert (Schubert, p. 301, 1986) discusses in terms of common places: teacher, student, resources, milieu.
Teacher-centered knowledge will provide the context of language that will address the roles, needs, concerns, and philosophical perspectives of the learner in order for teachers to become effective in what they do best. The following is a record of a path of teacher language toward computer-based technology as experienced by practicing educators.

CHAPTER TWO

AN EXEGESIS OF THE TERMS

Teacher Language Toward Computer-Based Technology

The following chapter details the process of hermeneutic cycles of inquiry which were used to bring an understanding to the various terms used in this dissertation, specifically those associated with the term "language." The chapter is not written in a linear fashion—from beginning to end, but records the cycles of hermeneutic reflection which are used to understand and shape the meanings of the terms. The chapter takes the reader through cycles of exploration of the terms in the context of teaching practice gained from personal experiences, observations made from examining other teachers in practice, and knowledge gained from dialogue with other teachers as they reflect upon teaching practice. The chapter also establishes how the hermeneutic cycle gains new understanding from academic readings, and the unfolding of the research itself in order to bring new meanings to the initial understanding of the terms. While the writing at times appears to repeat itself, it is merely reflecting the ongoing cycle in which the word "language" became central to understanding the basis of establishing the question that is central in this research. Throughout the research, the hermeneutic process comes back to the initial importance of the term "language" as addressed in this chapter. It should be noted here for later reference that at times the research appears to abandon the importance of the term; however, the term resurfaces again throughout the dissertation demonstrating how the term "language" reflects the central purpose and reflective inquiry that is modeled throughout this dissertation. Chapter Two establishes the importance of understanding the terms, and also provides a way of reading the dissertation which is essential to an understanding of the development of the research and in the findings of the research.

* * *

A Summary of the Changing Shape of the Terms through the Process of Hermeneutic Reflective Practice

The following section reflects the process that brought the researcher into finalizing the selection of terms both for the title and later use of the terms throughout this dissertation. The title is a reflection of specific and chosen word associations in which the words assumed shape as terms, as the words evolved in new meanings through a hermeneutic process of inquiry that examined change in teaching practice in the context of the influence that computer-based technology would have on such daily teaching experiences. The word-choices in the title also reflect the content of various academic and philosophical book and journal readings that shaped the entire study of this

dissertation. The choice of terms in this dissertation as reflected in the title is also the culmination of an exegetical study of the words which involved an examination of the subject of language as defined and understood in the context of the science of linguistics. This study included a brief etymological study of words related to the term "language," as I tried to embrace a more thorough understanding of the term as used in this dissertation.

As the research progressed through its various hermeneutic stages it was interesting to note how the various words that were initially chosen took on increased importance in terms of understanding the central focus of this dissertation and how each word, for a period of time became less or more central in understanding the nature and goal of this research project in relation to other words used in the title and in reference throughout this work. The terms used in the dissertation became more significant in conceptualizing and understanding the meanings that each of the words provided in the context of this study. I wrestled with the choice of words used to convey specific meanings in this dissertation; the process of literature reviews, interactions with other teachers, and the process of being engaged in reflective practice brought a clearer and more thorough understanding of the words used to convey the central elements and main focus of this dissertation.

The dissertation title began as "Teacher Language to Technology." As my hermeneutic reflective practice continued, the title, *Teacher Language to Technology* seemed to inadequately express the many facets and levels of the terms I was trying to articulate. For example, in my initial use of the term, "technology" it soon became apparent that the meaning being expressed by the word was too general. My study focused on a specific area of technology, which later defined as "computer-based technology." (It must be kept in mind that, when the research began, many terms that have emerged today in the field were unavailable at the time because the field was so new and little work had been done. Today, the struggle is to keep up with the proliferation of new terms as the field is expanding so rapidly.) Thus, the use of the term, "technology" was changed to "computer-based technology. This change recognized the process of inquiry I was engaged in that would expand each meanings of the term. The title then became, *Teacher Language to Computer-Based Technology*.

As each word was examined, it also became apparent that the term "language" needed to be approached exegetically to understand what was meant by the term both in the title and throughout the dissertation. The term, as stated, initially was used to convey and emphasize the notion of the "ownership" of the term, language. The ownership was connected to the spoken and written interactions recorded in this dissertation, which originated from educators in the field. As the initial idea was reflected upon in more detail, the word, "language" evolved to reflect the written or spoken forms of ideas, which would be recorded as "narratives." From the narratives, the word "language" was intended to also encompass the cycle of hermeneutic practice that would also expand the term to include questions that would emerge from this hermeneutic practice and would be the basis for further inquiry. Thus, the term "language" evolved to encompass the very notion of the hermeneutic model of inquiry, which would have its basis in narrative accounts as given by teachers. The very notion of this hermeneutic model became the foundation of this dissertation and allowed each term, including "language," to be viewed as a starting point for further inquiry and understanding. The use of the word "language" in the dissertation could no longer be viewed as a final, static, definitive notion of the term as defined early in the research; rather, the use of the words had to be understood as a model of the lived-experiences which changed and shifted to accommodate the meanings that teachers would bring to the dissertation through the continual process of reflective practice. As hermeneutic cycles of reflective practice continued, each term, as used throughout the dissertation, also continued to be expanded and articulated to reflect the very paradigm of what the terms seek to represent; a model of the growing and living record of professional growth in the field of education during a specific period while using a specific medium--computer-based technology—as a place to examine, understand, and improve daily teaching practice.

Shaping the Understanding of the Terms: The Process of Exegesis

The following section will provide a narrative account of the process of coming to an understanding of the meaning of the terms as used in the dissertation and as reflected in the title and throughout the dissertation. The sections will review the

background that lead to the original choice of the words and their meanings; the section shall also address how words were grouped together to convey a more specific and relevant meaning to the new terms.

Included also in this section is a discussion of the process that guided me to a linguistic study in which the science of language was examined to expand the understanding of the term, "language" as used in the dissertation. Finally, a brief etymological study will be examined in order that the terms might be understood in the context of present and past uses of the terms in this dissertation.

Shaping the Understanding of the Title

Exploring Language through the Path of the Lived-Experiences

In the Beginning...

During the initial work on this research, the term, "language" was used to reflect the notion of interactive communication within the context of a specific sub-culture--in this case the sub-culture referred to was the culture of teachers as found in a public institutional school environment. At first, the use of the word "language" was grouped with the word "teachers" in order to convey an "ownership" of a language and to distinguish the source of the language from all other stakeholders. "Language" was also understood to convey the idea of "a pathway of inquiry and reason that reflected the concerns and needs of the specific culture that was being examined—in this context it was teacher-lived-experiences." The term "teacher-language" was created to convey the sense that teachers were a source of knowledge that was unique and related to daily lived-experiences of teachers in the field of education. Thus, the term "language" was used to recognize that the teaching profession, like all professions, has developed a unique field of interest—education of students—that uses terms commonly associated with specific practices found in this specific profession. The idea is similar to what could be defined as a professional jargon.

My goal, however, was not to merely record teacher jargon as it related to computer-based technology, but explore the process of creating a language as found in

the profession that directs professional practitioners to develop specific meanings for specific practices which are usually understood to a greater degree within the specific profession. The opportunity to explore this process in relation to teacher practice seemed perfect because computer-based technology was so new to the field that, for teachers to engage in meaningful conversations about computer-based technology, they would have to develop a language to address specific practices related to the teaching profession. My examination did not want to record the "language" of those in the field of developing computer-based technology; rather, it was important to direct the research toward a language that would evolve from a consideration of the concerns and practices of teachers in the field of education who were attempting to acquire a way to address specific concerns that they perceived computer-based technology would bring to them. So the terms, as found in this study, were attempting to reflect a record of teachers engaging in dialogue with other field-workers as they attempted to identify, articulate, and share the information they were gathering as they moved toward a more thorough understanding of how computer-based technology could be understood in their personal practice as teachers. Teacher language, then, was the record of this collaborative dialogical process.

While some would argue teacher jargon is not as purely evident or defined as in some professions such as law or medicine; nevertheless, a professional jargon along with a process to such jargon does exist in the field of teaching even if it is not as easily recognizable to the public as in other professional fields. For example, teachers had concerns about such areas as "pacing," "teachable moments," "transition times," and a host of other practices. Computer-based technology would shape each of these terms as teachers reflected upon their common practices in the context of computer-based technology in their daily work.

It is not that the terms are unique only to teaching. However, in a sense, for teachers, the terms are unique because they are placed in the context of daily routines and practices. Thus, the terms are shaped and applied in the experiences of the teachers as they interact daily with students, staff and administration in the institution of education. In other words, teachers need to recognize their daily activities are unique and can only truly be applied and understood in the context of dealing with children on a daily basis.

This recognition became important in the development of my study because it recognized that teachers are a wealth of knowledge and the terms used in the profession are constantly revised and shaped to express specific meanings that are attached to present practices in education. Computer-based technology in the classroom offered the shaping of the terms because the terms would be shaped by the process of inquiry that would shed new information on the beliefs and practices of teachers as they faced a common issue of determining how they would approach the challenge of having computer-based technology as part of their practice. This process promised to allow teachers to have input on the direction new policies for education would take because the research was teacher-directed from the grassroots and was not seen as an outcome of parties outside the education field or stakeholders who are removed from daily practice yet are in places of authority to exact change. The decision-making model associated with the metaphor of ownership of the language became important because, as in many proposed changes in education, this change comes from a hierarchical model in which teachers are seen as recipients and technicians of educational change rather than the initiators for identifying, responding, and enacting educational change in the field.

> The teacher knew there was a world of difference between identifying problem situations through an evaluation of review and doing something about them. Working through a check-list does not necessarily stimulate professional development and improvements in practice; even if it satisfies the requirements of accountability (which I doubt.) (Elliot, p. 4, 1989)

As the research progressed, the two words "teacher" and "language" were inseparable, because the term was created to emphasize a relationship of the language to those who created the language. The idea of "ownership" was important because the joining of the two words helped to convey that teachers were the originators of the language and that the language was a reflection of the knowledge that teachers could bring to a discussion on computer-based technology as it was being proposed to be used in the daily practice of education of children throughout the province. In a sense, I felt that teachers needed to have a "voice" that would reflect their personal understanding and knowledgeable considerations of this present new strategy for education of students. I was greatly influenced by the work of Altrichter (1993) who noted that teachers are

experts in the field of education and should have a voice in examining educational initiatives and policies and be afforded opportunities to bring "... well-argued reports on professional matters" related to education.

> In analyzing our own experiences and reporting them, you make it clearer to others where you stand and why. We do not want to over-estimate the importance of rational arguments in public debate, but we believe teachers would strengthen their ability to shape educational policy and improve conditions in schools if their voices were more often heard presenting well-argued reports on professional matters. (Altrichter, et el. 1993, p. 177)

Why was this voice important at the inception of this study? When I started the research, and had an opportunity to be part of a group of teachers who were confronted with dealing with computer-based technology in the classroom, it appeared we were often viewed as somewhat "outsiders" of the process. The experts would instruct the teachers how to use this new computer-based technology, which promised to revolutionize the education field. What I discovered at the time was that few teachers, at the university and at my workplace, were very knowledgeable about computer-based technology as it related to education . As a result, many felt they could not address the issue of introducing computer-based technology into their classrooms simply because they lacked a starting place to formulate and ask the questions they needed in order to direct their teaching practice.

It is not that teachers were not being asked to help with the development of computer-based instructional materials--many were, including myself, but I found myself enthusiastically engaged in the novelty of computer systems having little time to examine the impact such development would have on the education system, and particularly on my own beliefs and personal teaching practice.

During the early stages of my involvement in the development of computer-based instructional software, under what was to be known as the Jean Talon Project, our group of teachers began to use some of our time to dialogue about our personal beliefs and concerns about computer-based technology in our own teaching practice. I discovered the process of discussion and open inquiry most useful in understanding my own notions of computer-based technology and how it would change the way I looked at my teaching.

Thus, I experienced a model of inquiry that could help teachers begin a dialogue about what was important to them. I was concerned that teachers have a "voice" before they saw computer-based technology introduced into their practice without having an opportunity or avenue to address specific concerns that many educators would have about this new technology. The initial creation of the term "teacher-language" was my attempt to convey this important element into the discussion of the research. The thought was that collaboration among teaching professionals must take place because teachers could offer insights into the instruction of children that could not be gained from being outside the field.

> Understanding the way teachers think, act, feel and intend, how their practical knowledge develops over time and how it interacts with classroom phenomena will enable, it is hoped, teachers and researchers to collaborative evolve more fruitful and mutually agreeable approaches to classroom change and educational improvement. (Butt, 1982)

The term began then with a hierarchical placement of words in the title. The word "teacher" was ultimately important because this was not "technological computer language in education" but the "voices" of teachers as they addressed the insurgence of computer-based technology. Teacher-language conveyed the idea that teachers can make a unique and valuable contribution to the development of educational policy. The term also suggested that teachers needed a way of addressing specific concerns to arise out of proposed educational changes, the type of change for example that computer-based technology would have on them

Thus, the language I sought to express in the title was not merely a set of terms to embody technical meanings of computer-based instruction, but words that were associated with the daily practices of teachers in which the term would be attached to some experience in the teacher's life that validated the teacher's understanding of the term. Hence, when a teacher uses a term such as "transition time" the teacher recognizes this as a pause in the context of daily practice that equips the learner to move more easily from one place of study to another venue of study. The term is general and commonly understood when used with teacher colleagues—it requires little explanation because the

term is associated to a teacher's personal experience in the classroom; yet, when used outside the context of teaching the term fails to be fully appreciated. This is because the term is disconnected from daily teaching practice. The term may not have an equivalent term based upon an experience that connects them to the teaching practice that the term attempts to convey. Teacher language was the recognition that the language of teachers is linked to daily teaching concerns in practice.

Going where no teacher had gone before...

What makes "teacher language" to technology so vital is that teacher-culture, like any culture or sub-culture, when put into an environment of what is unfamiliar will be apprehensive and cautious resulting in a loss of efficacy in addressing concerns related to daily practice. One goal of my research project was to empower teachers to feel confident in addressing change.

> Educational computers can be "very demanding of teachers, requiring retraining, changes in pedagogical practices, and an entirely new body of knowledge to master. The most exciting uses of computers in education are a radical departure from current educational practices and could be threatening to educators and parents alike" (Cheever, as quoted by Steven Cameron, p. 273).

Understanding that apprehensiveness is expected allows for the realization that the community of educators must be afforded an opportunity to dialogue and work through a process in which they can gain enough knowledge to address the concerns they might have. That is, language draws us to a community of collaboration and negotiation of considerations that will provide for more inquiry and which in turn will provide the basis for a new language or dialogue to emerge. Thus the word, "language" in the dissertation pointed to the notion of developing a process of inquiry through reflective practice that would engage the community of teachers to begin dialogue as a way of identifying concerns, learning more about personal daily teaching practice, and then collaboratively applying this knowledge to daily practice. Understood in the foundation of the term was the idea of teacher efficacy—being instruments to bring about change in teaching practice.

My sense of the term was that, given a condition or environment in which there is no apparent language to communicate with others of similar interest, teachers would develop "a way" of expressing themselves which would mirror areas of interest that were being presented by other field of concerns, but would establish areas of concerns that were not only directed toward the field of education in general, but were directly tied to the daily experience and practice of a specific teacher, at a specific time of teaching practice.

While I recognize that teachers would eventually learn the words or "terms" associated with the technical sense of computer-based language which often comes to education from outside the field of education; nevertheless, it was, and still is, my belief that a field of inquiry remains hidden from view if teachers fail to only learn such terms without identifying the concerns that come form daily teaching practice. Teachers needed to be provided with a process to help them articulate specific concerns related to their specific teaching practice. A focus on computer-based technology would not only address specific concerns about the technology, but would in a sense, provide a forum of discussion among teachers who are often isolated in their practice, and have little opportunity to dialogue with other professionals facing similar experiences in their daily practice. Thus the process of hermeneutics expanded the possibilities of this research project.

It is important to state that the study began at a time during which little was known of the terms that we now take for granted today in terms of computer-based technology. Therefore, the study also was a unique opportunity to explore over a period of time how teachers would negotiate and find a way to identify and express specific concerns. (As time continued it was interesting to note how teachers, as they became more knowledgeable in computer-based technology, expanded their concerns to other areas of practice.) Thus the term "Teacher Language" began with a narrow spectrum of meaning. The term failed to move the teacher past the vocabulary of the computer-technicists. Teacher language had to move beyond knowing the components of the machine or software because most teachers' concerns were associated with students, lesson strategies, and their roles as teacher.

Nevertheless, lacking the technological terms did not stop basic questions arising from teacher practice. Teachers still wanted to know how the computer-based technology would effect their teaching experiences. In this educational paradigm, based in practice, teachers were experts. Consequently, the questions that appeared before the terms simply demonstrated the growing process of change and how a language would eventually have to emerge to provide a pathway for common dialogue to grow.

Language then was understood and became a vehicle of inquiry before a common place of language-terms could be developed. Thus, when we attach the word "teacher" to the concept of process of language we are stating that there is a general sense to language as a vehicle of understanding, communication, and related personal experiences, but there is also especially a unique paradigm of perspective, and that is it the language that specifically associates itself with the dissemination of knowledge as understood in the daily context of classroom interaction with students, with subjects materials, and delivery of resource materials through various forms of presentation.

Moving Toward...

The preposition "toward" was chosen so that a sense of process would be conveyed in the title of the dissertation. Teachers were moving in relation toward computer-based technology. Teachers were not abandoning what they already knew; rather, teachers were drawing from years of teaching experiences toward another technology that would shape the way they understood and experienced their teaching practice. In other words, teachers would want to know how computer-based technology would effect teaching practice. If something has been working, why change? The question is not usually a question based on not being willing to change patterns of practice for convenience sake. Moreover, in most cases as I interacted with educators, the question was centered on the effect change would have on the students the teachers were teaching. Thus, the sense of the process, "toward" was very important to convey in the context of the title and throughout the dissertation.

Why Computer-based technology?

Teacher language toward computer-based technology underscores our changing focus from a more generalized term—"technology" to a more specific term—"computer-based technology." (It is important to note that the idea of computer-based technology isolates the technology the language is addressing. Technology is such a broad term. As Myron C. Tuman (1992) suggests, "technology" reflects the introduction of human ingenuity to solve a problem. He goes on to suggest that the term, "technology" is broad and encompasses all manners of human instruments: paper, pens, white boards, overhead projectors, chalkboard ledges, lights, heating and air exchange systems, desks, slate boards, chalk, tape recorders, and finally, computers, software.) These can seen as instruments of technology.

For this reason I specifically refined the term as computer-based technology. The term suggests that the research will focus on a specific technology that is influencing teacher practice, namely, that practice which associates itself with computers. This will include not only the hardware of computers: monitors, hard drives, mother boards, but also the application of software packages and the development of skills associated with using the computer as an instrument to do record keeping, or knowledge sources such as CD-ROM's and Internet access sights. It also includes strategies employed to engage students in using the computer as an instrument as in word processing to enhance the writing process, spreadsheets in order to convey the concepts of mathematical relationships, and countless other such software uses. The field is actually broad, as computer-based technology has grown to massive size since the inception of this research project.

In this context, the study is a vehicle to study teacher experiences which are reflected in teacher language. The language will emerge as educators respond to the many facets that are part of the teaching experience: administrative work, collaborative work with students, lesson planning, philosophical understandings of what an educated student is to the teacher, and further more the style, place of teacher in the classroom. Each of these is a common place of teaching interaction and activity. From this place the questions and reflective points will emerge and develop into the notion of language.

Thus, the language I speak of is not confined to mere collections of words and educational jargon—at some levels this will happen—but the use of the word "language" embodies the lived-experiences and a record of the process that brings understanding to what the teacher knows they must acquire in order for the practice to make sense, for the practice to be examined, and for the growth of knowledge to expand in their practice. This then laid the foundation to progress in my understanding of what I meant by "language," "teacher language," "teacher language to technology," and, finally, "teacher language toward computer-based technology."

The Emergence of the term "language"

It should be noted, while teacher-experiences initially directed the understanding of the term language and joined it into the word group "teacher language" it is also important to record the process that guided a deeper understanding of the word "language" as used in the title. As suggested in the previous section, the word group moved from the notion of "ownership" to the sense of a process of learning engaged in by teachers. The following section discusses how the study in the area of a definition for "language" directed the greater understanding of the term, and thus the term brought new meanings to the lived-experiences, and the lived-experiences brought greater meaning and direction to the definition. This hermeneutic cycle again expanded the term for me and provided a more accurate picture of the research and the research process expressed in the title this dissertation. The following section provides a record of the process through reflective practice that drew from the inquiry new meanings of the word, "language" as used in this dissertation.

In the Beginning was the word...Language

Reflection

I am reminded of the difficulty that many students have when a teacher instructs them to look up a word in the dictionary, find the definition of that word and then without using the same word or a close root derivative of the word in the definition write their

own definition. My own early experiences as a student still haunt me when as in so many cases even our great range of dictionaries fell short and I was left to say such things:

> **Place**: a ~~place~~ you are in or a ~~place~~ to go to. A location, or space, but not the type that has nothing in it, yet it could be too--sometimes like in Star Trek, Or a thing that you go to and sometimes it is where you are not, or you are....

In the same sense, when you wish to discuss a term like "language" you arrive at a very difficult quandary in terms of identifying what you mean by the use of the term. As the linguist, Walker states the irony is when discussing language you need "language" to express what you mean about language, and it is almost impossible to deal with the subject without somehow slipping in the odd use of the term in the definition. (Walker, 1994). Thus during the progress of this dissertation it became apparent that understanding the term would involve a drawn out process of reflection and thought. Such a process helped me to gain a fuller understanding of the term as it applied to my field of inquiry. The reflection and thought helped me to appreciate the difficulty in defining the term. In this sense I gained a new appreciation of the various paths that linguists have followed as they have explored the multifaceted meanings attached to the English use of the word "language."

Shaping the Understanding of Language: Exploring the Path of the Linguist

The Language of the Linguist

What is apparent when one examines the word "language" is that the word spans a wide area of meanings depending on the context in which the word is used. On one level the word can denote the many "languages" that exist around the world: English, French, Spanish, Latin, Chinese. The term language is also used to describe a set of patterns and rules established in a specific language-group that order the way one addresses another person in terms of communicating in the language-group; such use of the word does not isolate itself to merely audible sounds, but visual, cultural codes that

general meanings. Such meaning is related to grammatical structures. Third, the term is used to convey the idea of the formulation of thought and reason by an individual.

It is this spectrum of human activities described in the meanings that have challenged anyone who wishes to explore the meaning of the word language. Linguists who devote themselves to the study of language have found it imperative to distinguish between the use of two seemingly close terms: "language" and that of "languages." Such writers as Walker and Saussure suggest that the two terms, while interrelated, need to be defined as two separate concepts: language--one dwelling in the realm of physical attributes--the ability to make sounds or signs, individual thought and process; and languages--a term suggesting the use of language in the context of socially influenced activities and experiences.

> A language is necessarily social: languages is not especially so. The latter can be defined at the level of the individual... A language presupposes that all the individual users possess the organs. By distinguishing between the language and the faculty of language, we distinguish 1) what is social from what is individual, 2) what is essential from what is more or less accidental. (Walker, 1993)

It is interesting to note that Walker also distinguishes between the "language" and the "faculty of language." This suggests another element of being able to distinguish what is social from what is individual, and what is essential from what is possibly accidental.

Language, as used in this dissertation also reflects a process in which a specific social group sought to interact with other members of the same community about specific areas of concerns. Interestingly when the study began, language took on the meaning of something that was foreign; something that was a barrier to understanding. Teachers had a conventional language, but what could they do when the present language they possessed could not convey the concerns they presently wished to convey. This points to the sense that language is not static; it must move and evolve words to convey specific meanings that are related to present lived-experiences.

What is also apparent when one studies the concept of language is that the very nature of the study of language which we call today Linguistics--the science of the study of language has shifted to recognize the various aspects of language itself. To

accommodate the multifaceted levels of meanings attached to the notion of language. linguistics have followed various areas of concerns and the study has evolved into specific questions about different aspects of understanding the notion of language

Questions have evolved, in a sense, to address these changing notions of language and interests in the field of study. Linguistics has shifted over the aeons to address the changing notions of language; and, like the study of the word "language" in this dissertation, the focus of study in the field of Linguistics has also evolved to meet new thinking and understandings in the field. The difficulty that presents any researcher in offering a definitive construct is identified with the paradox that "Language must be studied through language."(Walker, 1993) In addressing the nature of language, Percy Walker points out the ambiguity and difficulty that exists when trying to make language an object of study.

> What is language? But of course, the reader will recognize that such a question is not easily answerable, for implicit within the question is language itself, which is no small problem! (Walker, 1993)

As Walker continues, " the problem [of defining language] is one of looking "at" rather than "through" language, for it is language that allows us the ability to conceive of "language." For instance, in one of his many essays on the subject, Percy offers that "trying to penetrate the act of naming [i.e. language] is like trying to see a mirror while standing in front of it. (Walker, 1993)

Language draws us to the origins of sounds and actions to convey and to receive meanings. The sense is that language is the vehicle for thought to flow: thought is the vehicle for language to exist. Such is the paradox that exists for those trying to articulate the full dimension of how language exists. Thus, the term "Teacher Language," as used in the dissertation, also exists as a paradox.

There is a sense Teacher-Language is communicating personal insights gained through reflective practice, and also a sense of communicating to others and receiving communication from others through dialogue. To use Walker's insights one would say teacher language must use language to convey the interests and knowledge that teacher's have about daily practice; teacher language is also the process that brings the teacher to

thinking more about the practice they are engaged in terms of daily teaching practice. Important here is the notion that language plays a significant role in the lives of individuals and is the cornerstone of community growth. This reflection has shaped this research and understanding of the use of the word "language" as used in this dissertation.

Shaping the Understanding of Language: Exploring the Path of Etymology

It is interesting, in our era, how our culture has attached the term "language" to computer-based technology. We speak of such things as "computer-language" which of course reflects the symbols and signs used to program the computer to carry out specific functions. It is also interesting how the computer field has its own jargon that is expanding each day as new computer-related products are brought into the market place. Today most people are familiar with such terms as RAM and ROM and CDROM even though they might not understand the full meaning of the terms. Now with the advent of the Internet, the computer-technology field includes such terms as URL's, MOOS, and MUDS to describe specific aspects of the ever expanding field. With such an expansion in the field and the need for new words to describe new emerging concepts there is a sense the individual in our society who wishes to learn or train others to use the technology must put forth a concerted effort to stay updated. Teacher language to computer-based technology then cannot remain static; it must evolve and move forward if teachers are to address the many different aspects of the technology as it shapes and influences teacher practice.

Also valuable in expanding my understanding of the various terms as expressed in the title of this research dissertation was undertaking an etymological study of the terms. I found an etymological study valuable in terms of understanding the evolution of meanings attached to the word given various historical and cultural settings. I also found it interesting to examine how words expressed different meanings when associated with other words. For example, in education circles, language is rarely used unless it is associated with the word, "literacy."

Today we speak of computer- literacy, much the way we once spoke about "reading-literacy." The sense is that there is an acquisition or a level acquired by the

learner in order to use and access specific knowledge associated with the specific type of literacy the learner is attempting to address. Hence, literacy expands the meaning of the word, "language." In the context of this study, teacher language became a vehicle to examine how teachers redefined literacy in the context of a growing emphasis on a technological world. Literacy draws teachers to evaluate their understandings and beliefs about what teachers feel characterizes an "educated person." Our view of the "educated person" directs the way we approach and develop curriculum. Our view of the "educated person" also shapes our daily practice in terms of what we hold as more important and what we hold as less important to our goal of shaping the learner toward our view of the educated person. If our view of an educated person shifts, then it is logical that our priorities that are at the foundation of our teaching practice will also shift. Such a shift in our beliefs will influence our goals and what we view as important for our students to know in order to participate in our society.

Consequently, teacher language toward computer-based technology speaks not merely of language spoken among teachers about the technology, but also speaks to the sense of how teachers examine and shift in their educational philosophy to address specific concerns related to the instruction of their students. It is this process that is reflected in the notion of literacy.

Finally, a brief etymological study into the origins of the word reveals that the word itself has conveyed many aspects of human interaction and thought. One of the words original roots comes from the ancient form of the word "Leden" which according to the on-line Oxford dictionary, shifted in many forms to denote the various aspects of the term. Early records suggest the word "leden" was confused by Celtic or early Romanic pronunciation and was thought to mean "native language." The confusion seems to have originated with the compound "iden" conveying the understanding of "book language."

What is essential to understand is that the term language" conveyed a narrow, yet broad expanse of meanings. A second meaning for the original word conveys the notion of "The language of a nation, people or race; and is also known as the "tongue" or native-tongue. The word also conveys the sense of "A speech or utterance of a person or class of persons; form of speech; way of speaking."

It is important at this juncture to understand that a study can seek to look for a meaning for a word like language, but fail to understand the complexity that exists in grasping what is meant by the term, simply because language has the characteristic of never being static—at least in practiced forms of the language. This is evident in the second etymological account is addressed here. The word "taal" which the English derivative would be our word "tale" conveys the idea of a tale, story, account.

What is important to this discussion is the relationship of the word "taal" to the original word it derives from which comes from the Dutch language. The word, "taal" comes from a dialect of the formal Dutch found in the Netherlands. The word originates from the Dutch who lived in South Africa. I mention it here because writers from Holland pointed out how the "Boer" Dutch was hard to understand and was considered a "dialect" a modified form of the pure Dutch language.

Why is this important in this discussion? It is important because to understand the notion of language, we cannot solely focus on a fixed, static dictionary definition. The word "language" must be also understood in the context of what it is, a living, evolving expression of communication. Language is constantly shifting. Cultures shape language, and language reflects and shapes cultures. The key is that language is alive and takes on the shape of those who will shape it to understand and convey mutual agreed upon understandings. The use of language then in this dissertation is both a picture of growing meanings related to a community of dialogue and a picture of a process of inquiry leading to further growth in practice. Teacher language toward computer-based technology challenges us to explore the process and the final shape of language as it evolves in this dissertation and is recorded in the narrative accounts of teachers.

CHAPTER THREE

AN HISTORICAL CONTEXT OF COMING TO THE QUESTION

This chapter provides an historical overview of the research. The chapter opens with a poem and a reflective narrative that addresses how teachers can struggle to incorporate computer-based technology into the classroom. The poem/narrative establishes a place to begin discussions about how I came to the question. Two sites of change are explored: 1.) my work with an education forum in which teachers openly discuss concerns relating to the introduction of computer-based technology into daily practice; and, 2.) my work with the Jean Talon project which established a forum to initiate action research in addressing concerns related to teaching practice.

Chapter Three also establishes the need for further research in the topic area and the importance of finding a methodology that will enable teachers to identify, and address concerns in their daily teaching practice as it relates to issues rising from the use of computer-based technology. Once again the chapter does not necessarily follow a strict historical sequence of events, but is focused on the hermeneutic aspects of coming to specific questions relating to teaching as it related to historical settings. Throughout the chapter I engage in a reflective-monologue in which specific issues are explored in the context of dialogues and interactions with other teachers, and also specific readings in the field including such writers as Tuman, Green, Postman, Cetron and Goodlad which provide a basis for deeper understandings and support of the work as it evolves through the hermeneutic process.

A True Experience on Teaching a Computer Class

On First Looking at Chapman's Homer

Much have I traveled in the realms of gold,
And many goodly states and kingdoms seen;
Round many western islands have I been
Which bards in fealty to Apollo hold.
Oft of one wide expanse had I been told
That deep-browed Homer ruled as his demesne;
Yet did I never breathe its pure serene
Till I heard Chapman speak out loud and bold.
Then felt I like some watcher of the skies
When a new planet swims into his ken;
Or like stout Cortez when with eagle eyes
He stared at the Pacific--and all his men
Looked at each other with a wild surmise
Silent, upon a peak in Darien.
John Keats

Few teachers would attach his or her experiences of integrating computer technology into his or her "ken" (the classroom) with the metaphors John Keats uses as he expresses awe and amazement of discovering for the first time an insight once hidden in the text of another writer. The wonder of being the first one to gaze upon a new star in the heavens, or the first to stand on some quiet and serene mountain top gazing upon some new world never before seen by earthlings is juxtaposed into a somewhat different pedagogical moment experienced with 30 pairs of excited eyes staring wildly at their new electronic mentors, their hands waving in the air and all asking in broken unison with new founded cyber-phobic jargon, teacher my "thingy doesn't work." Imagine with me the abandoned (deposed) teacher gazing up at the clock on the wall and then back to the classroom door looking for a glimmer of hope--a place of sanity, a place of serenity, perhaps even a place of escape; however, technology has called the student and the teacher to meet and negotiate alone in this foreign place. The teacher breaths a sigh, "If only <u>they</u> would disappear!" (ambiguity intended)

While the previous example might be a bit extreme in addressing the concerns that some educators face when change is thrust upon them, it must be recognized that many educators have made the transition to incorporating computer-based-learning into their classrooms without much concern or effort. These educators recognized computer technology would work well in the context of their classroom. On the other hand, we must recognize that for some educators, depending on familiarity with computer technology, availability of computer training, actual computer resources (availability of computer labs or computers in the classroom), or the lack of what they would perceive as valuable software for their subject area would not embrace such movement in their teaching styles. Steve Cameron addresses the topic of the impact of such a change to teachers by alluding to Daniel Cheever's work, *Cheever an Administrator's Guide to Computers in Education* (1986). Cameron's view is that teachers are faced with a demanding task and that computer-based technology poses "a radical departure from current educational practices..."

> Educational computers can be "very demanding of teachers, requiring retraining, changes in pedagogical practices, and an entirely new body of knowledge to master. The most exciting uses of computers in education are a radical departure from current educational practices and could be

> threatening to educators and parents alike" (Cheever, as quoted by Steven Cameron. p. 273).

Cameron's position supports the importance of providing teachers with appropriate times and resources to as he states, "promote understanding of [computer-based] technology." While he suggests seminars, workshops and tutorials, I believe teachers could also use the following process that will be established in this research as a basis for becoming knowledgeable about this topic.

> For this reason, the appropriate time and resources must be allotted to promote understanding of the technology to the educators themselves, through seminars, workshops, and tutorials. One of the tasks included in promoting understanding of the available technology is to make teachers aware of the programs currently available that aid learning. There is an ever-widening selection of software that can be used to supplement the teaching of subjects such as reading, math, science, history, and so on. Even so, courseware remains an issue. Despite this explosion of educational applications, software that can address the needs of particular curricula is still not always available. (Cameron, Goodlad et al, p. 20, 1994)

In a sense many educators might feel that the present course they are pursuing in terms of subject area content, communication of materials, and interpersonal pedagogical relationships are all working well, why would there be a need to introduce an unknown element into their environment? Myron Tuman, in his book *Word Perfect*, addresses this perspective in his discussion on the effect that the introduction of print technology had on a world which had solely depended on careful handwritten scribing. Tuman suggests that educators at this time also asked what the new form of print technology would do to the established norms of the age. Tuman noted that the emphasis on penmanship and careful attention to spelling was slowly taken away and reshaped to an emphasis on reading and understanding of printed texts. Tuman's point is that in a computer-based technology our notion of literacy will once again be challenged, and educators will once again be asking, "So, what is wrong with the way I have been teaching for the last 30 years?" (Tuman, 1992, p 31)

Postman supports Tuman's argument in his book *Technopoly*. Postman uses the story of Thamus, which is found in Plato's *Phaedrus*, to illustrate this point. In the story, Plato recounts the story of Socrates who tells it to his friend Phaedrus.

Thamus once was visited by the god Theuth, who was the inventor of many things, including numbers, calculation, geometry, astronomy, and writing. The god

Theuth suggested that the inventions should be given to the people of Thamus's realm. In the story Thamus examines the virtue and possible vice of each invention. From Thamus's examination of the technology of writing, Postman extracts his point for including the story in his book. According to Postman, Thamus was concerned that writing would make the people lazy because the people would cease to exercise their memory. In doing so, "they would become forgetful; they will rely on writing to bring things to their remembrances by external signs instead of by their own internal resources." (Postman, 1992).

Postman continues with Thamus's concern, as expressed to the god Theuth, "What you have discovered is a receipt for recollection without any memory. ... And as for wisdom the reality: they will receive a quantity of information without proper instruction, and in consequence be thought knowledgeable when they are for most part quite ignorant." Postman's concern is that every culture (and I would argue every individual stakeholder in such a culture, especially with the role to instruct others) cannot avoid addressing the issue of the impact of technology on the culture. " It is inescapable that every culture must negotiate with technology, where it does so intelligently or not" (Postman, 1992, p. 5). Postman encourages stakeholders to become like Thamus and approach all forms of technology with at least some exercise of reserved skepticism before embracing the technology and promoting it without examining the effect it will have on the culture.

I believe the following research question provides an avenue of skepticism. It is not that I am opposed to computer-based technology, or wholeheartedly extol its virtues; rather, this research provides educators with a vehicle to examine and explore their teaching and pedagogical environments as they are challenged by the changes that are being suggested in their teaching.

The research involves all educators faced with the pressures to make our students "computer literate" and also coming to grips with it means in terms of teacher practice. I pause here to indicate that years ago "computer literate" suggested that students were familiar with keyboarding, and the common functions of using business orientated software: word processor, spreadsheet, database, and some drawing capabilities for reports. Today computer literacy encompasses a context in which the computer can be used in numerous subject area settings to obtain information, as well as being used to disseminate and share information with fellow classmates, or globally. For example, for the social studies teacher it demands a new consciousness of skills such as creating searches, determining authorship of resource materials, and the ability to organize and condense vast amounts of resource materials. Computer literacy will also encompass

understanding the social implications of computers in our lives. In a sense, computer literacy encompasses skills that move us beyond the computer as an instrument, to the computer as a teacher. In this context educators need to be afforded opportunities to examine the role of computers in their classrooms.

Coming to the question was a process of discovery, starting with a series of preliminary studies which occurred early in my doctoral program. The following are extracts from preliminary studies conducted during this period of time. The study took place at the University of Alberta in conjunction with the Jean Talon Project which will be spoken at length later. The observations took place in two different settings: (1) A one-day education technological forum held at the University of Alberta and (2) Over a period of six months with a group of educators that were asked to contribute to the development of an interactive computer based program for instruction of grade nine social studies teachers. The following two abstracts contain numerous observations, reflections, theory, and follow-up actions of the participants in the various sites of change and contain a journey that brought this researcher to the question of this research project. These preliminary findings will demonstrate the surfacing of pedagogic questions related specifically to teacher language to technology.

II. Preliminary Study at an Educational Technology Forum

The Setting of the Forum

The following observations were taken from an ethnological study conducted at an educational technology forum in which new educational technological projects were displayed and demonstrated to educators at the University of Alberta in the Fall of 1995. Educators from all fields were invited to visit a number of exhibits which included some of the first uses of video-conferencing using computers, computer-generated overheads projected onto a viewing screen, various software packages relating to education, and other innovative ideas in the field of educational technology development.

* * *

Goals of Observation

During the forum, I specifically focused on observing teacher interactions with the presenters at one of the displays which was a multimedia interactive instructional

program using a CDROM format. The CDROM was designed to aid the instruction of grade nine social studies economics in the classroom. (At the time CD-ROMs were not in common use and the format was not readily available for use in a classroom setting.) I choose this specific technology solely because of my involvement with developing the CDROM. Through my initial work with the project that led to the creation of the CDROM , I wanted to use the opportunity to see how educators would respond to the project, and more specifically what concerns they would have. My goal was to listen to the questions they would ask and record my observations. The following observations, and later reflections, were taken from my field notes and are recorded here as they are the basis for the coming to the question I now seek.

At the forum one of the producers most familiar with the program sat at a table demonstrating the CDROM on a computer and fielded questions about the program. Throughout the afternoon, many people viewed the presentation. Those observing the demonstrations were not allowed a hands-on experience simply because, at the time, the software was not fully operational. Many of its capabilities were not up and running, but enough of the project could be shown to give observers an idea of the poter.tial that the material before them could have in their classrooms.

On a number of occasions I noticed a few educators standing at a distance with an interest to observe the demonstration given by our computer demonstrator. The first discussion that took place was between computer programmers who were interested on the merits of using one computer system over another other. The discussion was filled with a tangle of technocratic jargon the discussion over the choice of using an OS2 operating system versus a DOS or windows version. Questions were also fielded by one programmer who asked whether the software could be integrated with other software packages on the market. The conversation went on for a time. Many of the educators watched the discussion, but few engaged into this area of discussion.

As time continued I noted that some people who had stood at a distance came closer to ask questions once those more familiar with the project had stopped talking about operating systems. One teacher was interested in how we knew which icon to touch on the screen so that the student would be able to find the information they needed. What was interesting was that the educator knew what they wanted as an outcome -- to help students travel through the system, but did not have the vocabulary to address the concern. In the teacher's own words, " how do you know which 'thingy' to touch so that the student will be able to find the material they want?"

As Marvin Cetron states that the goal of programmers is to bring the interests and goals of those who use the programs into consideration. With the newness of the system,

we were obtaining valuable information from stakeholders that were going to possibly use the system. The difficulty of articulating the needs of the stakeholder--in this case a teacher, was not foreign to computer programmers, as the stakeholder is unable to converse in terms of how can I program this machine to do this, but rather what I need to know to instruct my students to achieve specific learning outcomes.

> The dilemma before programmers is "to bring backgrounds, interests, goals, and selected curricular activities into effective juxtaposition so that the needs of the individuals and the needs of the schools are met simultaneously" (Cetron, Goodlad et al, p. 20.)
>
> Not all programs are suitable or even desirable, and it is often difficult for the layman to judge (Cetron, Goodlad et al, p. 20.)

The question was important in the context of understanding the computer system in the context of the classroom. (Keep in mind that a CDROM format was new at this point. Most teachers were probably accustomed to using a book which basically follows a linear pattern from introduction to conclusion, from page to page, from chapter to chapter, and from cover to cover. But with a CDROM format using hyperlinks the teacher was faced with a new framework of reference since such programs can jump throughout and into other sources of text in a randomly defined order directed by the user.) Simply put, the question was concerned with the teacher's ability to guide a student through the system. Without having an understanding of what is a "hot-key," something that would become quite familiar for those later familiar with HTML (Hyper Textual Markup Language) on the Internet where a highlighted text is hypertextually linked to various sites around the world, or within the confines of the base document itself it was inconceivable that the teacher could understand the randomness of following the text in the system.

Personal Reflection

It is also interesting that in developing the first CDROM our group had to figure out a universal visual code so that the user of the software would be able to identify what portion of the screen was "hot" or linked so that the user would be able to connect with another site easily. Today a somewhat universal code exists that many computer programmers adhere to. When the code is not followed, confusion follows, especially for those familiar with the language that is built into the system through the shape, size,

direction and placement of the icons on the computer monitor screen. For example, if the computer has a mechanical input device known as a mouse, in many cases an outline of an arrow provides a reference to what the user of a system is pointing to on a screen. By positioning the arrow on predefined locations (coordinates) on the computer monitor the user is able to input information to the computer through using a conjunction of mouse input actions such as (clicking, double-clicking, click and drag, movements which require pressing a combination of buttons, and also moving the mouse across a flat surface. The combination of place, movement, and action provide for the user a number of different possibilities of outcomes. An arrow pointing icon changing to a hand shaped icon often indicates that if the user can move a picture or other placed item on the screen to a new location. This is one of thousands of different possibilities available to computer users. To identify and know the many uses of the icons, their shape, size, color--filled or transparent, whether they are active or inactive are all part of knowing how to decode and use the software package. Over the years these codes have grown and have become familiar and understood by most users of computer based technology.

It is interesting to note that at the time of the initial development of the CDROM no universal language had yet been constructed. The codes were still at the infancy stage and as such the conception of even using the mouse to click on the screen was new. The teacher who wanted to know which "thingy" to touch, perhaps was unaware of what he or she was asking, brought up a good point -- a code needed to be set so that students could navigate through the system. Thus teacher's language to technology begins with a sense of the pedagogue and the concerns that face teachers in the context of the classroom. Developers knew from the teacher that a universal language of codes needed to be developed or it would be impossible to navigate in the software program.

My point is that educators want an understanding of how to use the system in the context of daily practice. A teacher's inability to ask the question is limited to an assumption that when one wishes to address a "techy" device one must speak "techy." In some senses this is true, but if educators are to come toward technology they must be afforded an opportunity to ask questions related to the common places of the classroom. The question did not ask, how does this work, but rather how can I guide my students through this material? The question is orientated to pedagogical experience, and not merely to how the system operates. It would appear that both questions are important to the teacher.

Continuing Observations at the Forum

Many other teachers asked how this technology would work in their own classroom. It is one thing to suggest bringing the technology to the school and to other classrooms: it is something else to bring it to your own classroom. Many educators cite resource restrictions, or the inability to understand the system themselves; therefore, until training was provided they would not be comfortable enough to use it. Others suggested that the system would create more problems than it solved because the material only offered another milieu for dissemination of knowledge, something they believed textbooks could do much easier and readily. The insights of these educators provided interesting reflections on my own understanding of the system.

Reflection on Observations

As these educators attempted to bridge the gap of applying the technology into their daily practice, I was reminded of the process that the developers of the system proceeded through to come to a deeper understanding of this system themselves. I realized during the open forum that to bring teacher language to technology it must be a journey in which the teacher is allowed an avenue to explore the questions that come out of daily practice. These questions allow the teacher an opportunity to examine problems they face in the context of instruction, and provide a reason to initiate reflective practice. I also realized that educators need opportunities to journey with other educators facing similar questions.

Reflecting on Theory: Technology in the Classroom is not Neutral in Effect

A Case made by Apple

In my readings I found the comments of M.W. Apple, as quoted in Tuman's book, *Word Perfect: Literacy in the Computer Age*, valuable as they draw to the importance of moving beyond the machine and asking questions that are pedagogical in nature. While Apple discusses the notion of the influences computers will have on societies understanding of literacy, I believe a parallel can be drawn in relation to teachers and the sense of understanding their role in the context of introducing computers in the classroom. I draw the reader's attention to the notion that Apple challenges educators to move beyond the "technical correctness of what computers can and cannot do." (Tuman,

1992, p.122) He calls these questions the least important. Apple goes on to challenge the reader to look at the impact of introducing the computer into schools and to move beyond the machine to ask questions of how this will impact our students. Apple also suggests that the technical correctness of what the machine can and cannot do is not what society should be concerned with, but that a deeper question remains. This question is about the purpose of the school and about whom the school serves. What is important is that educators be afforded opportunities to move beyond the tool of technology to ask pedagogic questions as they face them in the context of daily educational praxis. While Apple's concern is the ideological nature of the issue, a similar pedagogic concern which might embrace ideology, ethical, theoretical, or practical knowledge should be pursued by educators to have their concerns met.

> At root, my claim will be that the debate about the role of the new technology in society and in schools is not and must not be just about the technical correctness of what computers can and cannot do. These may be the least important kinds of questions, in fact. Instead, at the very core of the debate, are the ideological and ethical issues concerning what schools should be about and whose interest they should serve. (Apple 1986, Tuman, 1987, p. 153).

Teachers must be encouraged to move beyond the technology to ask pedagogic questions. Teachers must be mediators of knowledge and must ask questions that frame their praxis. Teachers are concerned with the learner and must ask questions that seek to discover how any introduction will effect those we mean to teach, and specifically how technology will shape the way we understand a "literate" or educated person.

> ...computers involve ways of thinking that are primarily technical. The more the new technology transforms the classroom in its own image, the more a technical logic will replace critical political and ethical understanding. The discourse of the classroom will center on technique, and less on substance (Apple, 1986, Tuman, 1987. p. 171)

Consequently, teacher language toward computer-based technology requires an understanding that it is not merely what can I do with a computer system. Educators must be afforded a process whereby they can address the nature of pedagogical questions, such as how technology effects my view of education. How will technology in my classroom influence my interaction with students? Will my role as I envision the teacher change? As Havelock, Tuman, and Borgman point out computer-based technology has the potential to alter the very way we look at teaching as did previous epistemological shifts due to

technological changes in our society. These questions move beyond the instrument (tool), to the concerns of the educator and the place of computer-based technology in terms of student/teacher relationships and the role of the institution as we know it today in the future. Will computers change my view of what a "literate" and "educated" person is in our society. As Don Langham points out in his paper, *The Common Place MOO: Orality and Literacy in Virtual Reality*, Havelock notes the following shift in social orders when a culture moves from an oral tradition to a tradition based on printed materials. The shift Havelock indicates will effect the teacher's place in the student's learning experience. The student will have "the appearance of wisdom by reading widely without benefit of a teacher's instruction." (Havelock, 1994. P.7.)

> ...the memory of an oral culture is based on social routine, ritual, public discourse: "The memories are personal . . . yet their content, the language preserved, is communal, something shared by the community as expressing its tradition and its historical identity" (70). Writing, on the other hand, promotes the dissolution of communal intimacy associated with primary orality, allowing the individual to divorce himself from society. Thus, not only does writing affect the larger social order, these "external marks . . . alien" to the individual work to alienate the individual from traditional society, allowing the student, for example, to achieve the appearance of wisdom by reading widely "without benefit of a teacher's instruction" (Havelock, 1994, p.7)

III. Overview of the Jean Talon Project

> The pilot project Canada Responding to Change is producing two interactive products as part of the Jean Talon initiative of the federal government. One is for use in grade nine social studies, and the second is to explore the use of multimedia by adults with reading difficulties. These products are based on principles of guided inquiry with a cognitive psychological base. The project is being undertaken using Digital Video Interactive (DVI) technology which provide video and image file compression along with other features. The products will be released in a CD-ROM format. (A Synopsis taken from the Instruction Fair. I wish to give credit to Dr. Sharon Jamieson, David Mappin, and Yvonne Norton who headed up the Jean Talon project.)

The Jean Talon Project was a research project sponsored by IBM Canada and an agency of the Federal Government which supports the development of Adult linguistic development. The project was conducted across Canada with different components being developed in many areas. At the University of Alberta the focus was on developing a unit to teach grade nine junior high students economics using a CDROM format for bringing

the instruction to the classroom. While the material is broad enough to be adapted to various levels of students across Canada, it is intended to focus specifically on the Alberta Grade Nine Social Studies Program of Studies.

At the time of my involvement with the project I had no inkling that so many questions would evolve from this project. My sole interest was to explore the innovative aspects of CDROM technology. CDROM technology promised multimedia presentations at the finger tips of students, and having worked on the development of social studies textbooks I was fascinated at the possibilities that this technology could bring to the classroom. I would later discover that I was venturing into new territory and there was no theory yet developed to test my assumptions or direct my practice. The Jean Talon project allowed me to move toward the question that I seek in this study.

The Jean Talon Project As A site of Change

Early in my doctoral program I was asked to be part of a group of three educators and one project resource person to help design the student centered instructional components of the project. Our task was to develop lesson plans that would help students develop critical thinking skills.

My work with the *Jean Talon* project spawned many interesting group discussions surrounding the changes that CDROM technology would bring to the present classroom environment. While much of our discussion focused on what the technology could bring in terms of instructional capabilities -- critical analysis, synthesis of material, inquiry model of questioning, as well as reading, writing, group-work, listening, and visual skill development -- I also become aware of the implications that such technology would have on the classroom in terms of the role of teachers, teacher/student relationships, and the availability and access of library quantities of information pertaining to specific issues.

In conversations with other educators during my graduate studies it become evident that, even though this new technology proposed to provide a rich resource of instructional materials the implications of having a CDROM system available in each classroom was greeted with some reservation. Some educators indicated a concern about the implications the introduction of such technology has

for the role of teacher, and also the implications such technology has on teaching styles, strategies, and instructional methodologies used in classroom settings.

> Computer-based technology has value in a learning context only to the degree that appropriate software is available and teachers and students have appropriate techniques at their disposal to use the technology effectively. The provision of software is critical and represents a significant portion of the cost of equipping a school and classroom appropriately for learning. There is a specific role for curriculum-specific courseware, as there is for reference materials that may be available in CD-ROM format or browsers for accessing learning resources on the Internet. Basic computer applications fulfil yet another role. (In the Saskatchewan Instructional Development and Research Unit (SIDRU) for the Saskatchewan School Trustees Association)

Other educators indicated that the technology appeared hard to use and inflexible in design which posed some concerns in relation to their present instructional practices. What was also interesting was that many issues revolving around ethical considerations also became known. This became extremely evident when it was mentioned that it was possible for the teacher using the CDROM to actually record the direction and time spent on each application by a student using the system. This provided an avenue for some very interesting dialogue.

Cycle One: How do our assumptions and notions of technology affect our teaching?

Observations

At this point in the project, the Jean Talon team was asked to work on a number of case studies and create lesson plans that would reflect how we would teach a particular concept to a social studies nine class. The team was informed we could incorporate video, sound recordings, and huge amounts of text which provided a greater freedom and flexibility in creating strategies to make the material interesting and valuable to students. The aspect of a rich source of text, and the opportunity to incorporate speeches, debates, and also video of actual events intrigued us. The possibility of such venues to liven up the presentations for our students freed our group to present many wonderful and novel ideas.

We were also encouraged to keep in mind that the CDROM was to be built to allow students as much freedom to address problem solving as possible. The idea was to

develop an inquiry mode of instruction -- that is to allow students to conceptualize the problem given to them, create a strategy for addressing the problem, and then allow students to search the information and draw conclusions from the material they acquired using the resource files found on the CDROM.

Another element that came up in our discussion was the possibility of the program tracking a student's progress by flagging the student's course of action. More specifically, a student could go to any file on the CDROM. Programming within the CDROM would then allow a teacher to later see where the student had gone, and in what logical order the student had proceeded. It was even possible for the program to record how long a student stayed at each subject area. The thought was that teachers could have information before them that could help students set new strategies in acquiring the information they sought -- skills that would be valuable for them. It should be noted that this one area was discussed at great lengths as it was suggested that such a hidden aspect of the program could construed as intruding on the privacy of the learner and could be understood as a violation of students right to privacy. The sense within the group was that we were treading on new ground. The technology was challenging what we believed to be ethical in relation to our students. While students often share their work with teachers and it is recognized today that student's work is the property of the student, even so it could be argued that patterns of reasoning and thought which the program would record could be in violation of the students' personal freedom, especially if this was done without the consent of the those using the system. While this may have not posed any real threat to a student's rights, it did remind the group of the need to respect the power of technology, and temper our work with care and attention. The technology had pushed us to ask what we believed about teaching, and our responsibility to guard the rights and freedoms of our students.

Reflections

During my work with the project, I found that my opinions about technology changed dramatically. As I mentioned before, I saw the computer-based technology in terms of an excellent resource for students; in fact, I saw the possibility of having the CDROM replace the present textbook format. The possibilities of integrating questions and observations about live video, sound, and pictures seemed endless. As I became involved with the project, I began to have reservations about the implications that this technology would have on teachers. While I enjoyed working on the project, I realized that I had questions about how the technology would effect the nature of interaction with

students. I also had questions about how I would use this technology in my class. At first I kept these thoughts to myself, for I assumed that the questions were probably not shared by others and would only create needless tension. It wasn't until one group member stated openly during a coffee break, "I am having some questions to whether I really want this technology in my own classroom," that I realized my concerns were not merely isolated to my own practice. Altrichter et el. in his book, *Teachers Investigate their Work* addresses the importance of teachers sharing their knowledge as a way of dealing with the sense of isolation in their practice.

> ...research knowledge developed by individual teachers can build up a collective knowledge base upon which individual members of the profession can draw, and which forms a bond between them. We think that such a knowledge base, primarily produced by teachers, is an indispensable prerequisite to strengthening the collective self-confidence of teachers and overcoming their damaging sense of isolation. (Altrichter, et al., (1993, p. 178-179)

When the group member stated honestly what she was thinking, she opened up the possibility of the entire group to examine their beliefs about technology and its effect on teaching practice. The action of the group member was timely as it allowed each of the group members to state what they were actually thinking about the technology before them.

For me, the greatest concern was that there appeared to be an underlying premise that teachers were going to be viewed as mere technicians, and that the technology was asking teachers to "measure-up," "catch-up with the times, be innovative with ideas, and interesting with presentations." There was a sense that teachers were not doing a very good job at engaging students in learning, or an underlying assumption that the average teacher fell into a category of blasé practice and that computer-based technology would be the savior of learning. I could anticipate that teachers might see computer-based technology as a direct attack on their teaching practice if this technology was presented to them in this fashion. In some ways, I was feeling that without input from teachers, teachers would see computer-based technology as an invasion of their autonomy. As a group we discussed how this CDROM technology could change the classroom of the future in terms of the role and autonomy of the teacher. Without considering the autonomy of the teacher, the teacher could be viewed merely as a problem shooter and a mediator (facilitator) between the learner and the computer-based technology system that

was providing the resources and venue to instruct them. We noted that this shift in roles would have to be addressed by teachers if teachers were going to consider using computer-based technology in their daily practice.

It is also interesting to note that the developers of computer-based systems for instruction recognized the importance of addressing teacher roles and autonomy as a prerequisite for success in introducing the systems into schools. Developers realized early that some of the reasons for their initial market failures of many computer-based instructional systems was the sense that the developers and marketers of the systems failed to recognize the implications and social structures that would be affected by the introduction of computer-based technology. The resistance of educators to these systems presented an interesting problem to solve for the developers of the systems. Warren Baker in the article, "The Mediated Learning Approach to Computer-Mediated Instruction, Learning and Assessment" isolates a number of factors hindering the introduction of CMI (Computer Mediated Instruction) into the classroom. He suggests the developers were trying to sell a product and the teacher and student were suppose to recognize the "potential" of the system with little resistance. Without addressing these considerations, developers struggled to introduce computer-based instructional systems into schools as they had planned.

> The featured materials were rarely, if ever, accompanied by a "user's manual," explaining what new teaching methods and options they made possible for instructors, or what new learning strategies and methods they made possible for learners. Again, this outcome is not surprising since few of the goals in the development these programs were intended to stimulate transformative thinking on the part of instructors and their students regarding the nature and character of technology-mediated teaching and learning. (Baker, et el. 1997, p. 2)

Another concern that our group discussed was that the CDROM, though novel in approach, would remain as a "time-filler" rather than viewed as a resource teaching aid. This was coupled with the fact that, to replace the textbook, the CDROM would have to be available to each student, and be able to be transferred to the home in case of further studies needed by the student. Simply put, while the project had many positive attributes it nevertheless fostered pedagogical concerns that had to be taken seriously. Second, the concerns of teachers would need to be addressed before such technology could be used widely in the classrooms of Alberta.

It was clear from the concerns that were being voiced it would be profitable if we

took some time from our weekly meetings to direct our thinking toward our teaching practice. The discussion gave an opportunity for each member to address concerns in an open and informative environment. As our group continued to meet each week to work on the Jean Talon project it became apparent that our weekly discussion times were also becoming useful in providing an understanding of our own teaching practice. Finally, after a few weeks our director initiated a proposal in which our group could undertake a study in which we would examine the very question that seemed to articulate our concerns. We identified our first question as being:

How do our assumptions and notions of technology affect our teaching?

Upon identifying this starting place, each week we would examine the work we were proposing for the Jean Talon project and reflect on how our work affected our teaching practice. We believed two things about this process: first, it would help us reflect on our own teaching practice and second it would help us anticipate questions that might arise when teachers wanted to know how they could incorporate and use this software in their classes. The very question we began to address connected us to the project in a new way, as we continually asked how will this would work in my classroom and would I, as a teacher, use this in the present format?

This initial question spawned a number of topics which helped us examine our notions of technology and the assumptions we had related to our teaching. Coming to the question initiated a process of reflection and a basis to begin a collaborative effort to make sense and discuss strategies that would help our understanding about computer-based technology as it concerned us in relation to our teaching practice.

Cycle Two: The Effects of Technology on Teaching Strategies

As we continued to work on the CDROM project and met to discuss new ideas, we held a brain storming session. Since most of us had worked little with multimedia software recorded on a CDROM we found it difficult to conceptualize what we could place on the CDROM. (Keep in mind that most hard drives at the time held only around 20-80 megabytes of data. A CDROM is capable of holding over 600 megabytes of data.) We found it difficult to think in terms of what the computer could do. Our ideas focused on present practices, and we asked the computer to replicate many of our present strategies. Examples of this was having the computer generate multiple question answer sheets for the students, having the computer generate charts and graphs displaying

information that was given to the computer by the students. One common question that kept surfacing was "Can the computer do this?" Am I too far fetched? Is this possible?

This drew us to a consciousness that the computer obviously had limitations that would affect how we framed strategies for teaching our students. On one occasion, for example, we were considering having students play a game in which the game would be similar to "Wheel of Fortune." Students would gain points, and could compete with other students in discovering the correct answers. We also discussed giving the teacher the option to record scores, which the program would keep track of. While we thought these ideas were creative and novel -- we discovered in our monthly meeting with the programmer that were imposed limitations by the capabilities of the computer system that we had to consider. This presented some trouble, especially for our group as we had to conceptualize what this meant in terms of developing lesson plans and strategies to engage our students in the learning skills and concepts we were trying to emphasize. Some limitations were the amount of storage space on the CDROM. (We discovered sound, pictures, and video files took a lot of space.) Other limitations included financial considerations. For example, some of our ideas demanded hundreds of hours of programming time which was extremely expensive, so we had to choose ideas that both fit the data-space requirements, and also had to keep in mind the fiscal boundaries of the Jean Talon project.

Thus, our group became aware of the structures and limitations that educators must address each day when planning their lessons. In the same way we were limited by what the technology could do and the fiscal constraints we became aware of how resource limitations shape our daily routines in our classrooms. The resources they presently have limit the learning environments that teachers can create. For example, it would be impossible to have an electron microscope in most high schools to do extensive observations in a biology class that is examining the growth of plankton.

What became foremost in our dialogue about these limitations was our concern how the limitations of CBT(computer-based technology) structured a way of knowing for our students. With computer-based technology, we began to wonder in what ways would the limitations of the CBT system shape and direct the learning skills our students were using to acquire the knowledge they needed for a specific course. We also wondered what skills would be gained, and what skills would be lost if teachers were not aware of the effect CBT system limitations could have on student learning outcomes. We were concerned that we might be imposing a way of knowing that would restrict what and how a child will learn.

David Dillion addresses this structure of knowing that is imposed by the computer

in his article, "The Dangers of Computers in Literacy Education." He states that the "...limits of the technology create dangers." (Chandler, 1985 p 94.) Dillion suggests CBT systems impose a framed way of knowing by providing limited methodological approaches to the presenting of materials, and a limited availability of choices it offers to students in acquiring the information needed to complete an assignment. Learning skills become confined to specific and guided ways of knowing imposed by the limits of the technology. Dillion points out that the computer supports a scientific paradigm but leaves little way of acquiring knowledge in other ways. The importance of his work here is the sense that educators need to be aware of this imposed structure and recognize the benefits and dangers that come with computer-based systems.

> Just as any style of language has the power to shape our knowing, it simultaneously limits our knowing. Structuring knowing in one way automatically eliminates other possible structures or ways of knowing. Thus, to be creative, original, and continually learning, learners must be able to reshape and restructure existing knowledge as well as to acquire new knowledge. Computer language (not just the word, but also the sequences, frames, interaction patters, and so on) both empowers and limits our knowing....Many claims are made for the thinking processes that computers foster in learners, but on closer inspection "thinking" usually refers to a linear, categorical, recursive, 'flow-chart' system of thought. In short, a highly 'logical' and rationalistic metaphor of knowing. Its potential appears to be in fostering growth as scientists and researchers in a narrow (but unfortunate typical) sense. While this type of thinking is undoubtedly valued in most classrooms, it is clear that such a view of the universe is only one way of knowing--and not necessarily the most powerful one. (Chandler and Marcus quoting Dillion, 1995. p.95)

The limitations imposed on our planning brought us to another understanding of technology. Any teacher developing the program-lesson would have to be aware of the limitations and imposed structures of the system. Furthermore, it stood to reason that, in the context of the classroom, certain limitations would shape the teaching style and methodology chosen by the teacher. Second, we had to ask if our lessons addressed the different needs and learning styles of our students. In this context, our second question emerged and we continued to explore the concept of what happens to our ideas as we use computer-based technology.

What happens to our ideas given the limitations of the technology we are attempting to use?

Teachers each day must decide whether they have the equipment, the resources, the time, and the space to conduct certain lesson plans. The teacher is faced with asking if I move the class into specific groups what changes will this make in my teaching style? How will I grade these students? What advantages or disadvantages does group work have? The teacher cannot, for example, ask students to make 1/2 hour movies about some topic area if the teacher cannot provide the resources such as a video camera so that the students can complete the project.

In the same way, technology frames our response, our teaching style, and shapes the direction a class will go. To change the class is no little thing for the teacher who must keep in mind classroom management, student needs, learning styles, learning speeds, and resource limits for a lesson. Carolyn Boiarsky's article "Computers in the Classroom: The Instruction, the Mess, the Noise, the Writing" addresses this change in teacher and learner roles. In Boiarsky's school she structured her writing class in a newsroom type of environment. As a result her role of teacher became more like an editor or coach. The role of the student became that of a journalist. In this way, the computer technology allowed for a different teaching strategy and the new environment shaped different expectations for both the teacher and the students. The new roles shifted the teacher/student models.

> In these unique configurations there is no longer a "front" to the classroom. Students' eyes are drawn to a monitor rather than to a lectern or chalkboard. The traditional lecture format is no longer valid. The classroom inevitably becomes a workshop in which students, as young writers learn to write by writing, acquiring skills as they write with the help of a teacher who now assumes the role of editor. (Handa, 1990. P.55-56.)

It is important that teachers have knowledge that will help them shape teaching strategies given new approaches to teaching practice that computer-based technology can offer. The limitations of technology can frame certain courses of action for the teacher. An example would be realizing that only a limited amount of computers exist for students to use in a lab or in the classroom itself. The ratio of computers to students will already mean that the teacher will have to either go into group work, or have specific students work on the computer individually, and then switch with other students who are engaged in other classroom projects. One must also consider how the computer lab is structured. Are students facing each other--as in pods, or are they isolated from other students.

Where you stand as a teacher to call for the student's attention may be a challenge in itself, especially when competing with a computer monitor that has animation on the screen. If school policy, as in the case of the school I work at, will not allow a teacher to send students to the computer lab without a teacher being present at all times, then the teacher must alter the strategy of the lesson once again. The reliability of computer-based technology also plays a key role in influencing whether a teacher will use computer-based technology in the classroom, and it will also determine in what capacity the technology will be used. Earlier, in my introduction , I addressed the concerns of an educator facing a class in which the computers failed because of a software problem.

In the scenario I sighted at the beginning of this section, I had twenty-two students in an Apple II GS lab. I wanted to instruct my students to use the Apple II G's. I had previously gone over what students would see on the screen and had them sit at a computer terminal. However, I was to find out later, that the machines had been donated to our school, and the donator had failed to fully warn us that most of the operating software had been compromised and often failed to work properly. I was unprepared for the following as I discovered to my amazement that one-half of my machines were inoperable and unable to load the necessary software to perform the task I wanted my students to engage in. I was left with eleven students trying to boot-up systems that were incapable of carrying out the task, and the other eleven students wanting to move on but needing my directions to do so. The result was having to change my lesson plan spontaneously. The result was that I ended-up frustrated, found I had wasted a lot of time, and was spending my time as a computer technician rather than accomplishing the task I had set out to do.

The unreliability of the machine directly effected my class that day, and it also set a tone for future use. I was reluctant to go through the same scenario again. While I do not blame anyone for this mishap, I include this incident as an example of how the teacher can feel out of place, especially with a technology complicated enough to create major disruptions in lesson plans, yet purports to being so user-friendly that a child could master it. While reliability of equipment can always be a problem in a classroom -- after all, the overhead projector could easily burn out a bulb -- the key is that the teacher can easily use another medium, for example the chalk board to complete the task. In the case of computer-based technology much of the earlier years is isolated specifically to learning how to use the physical aspects of the computer workings themselves, thus it is nearly impossible to facilitate the learning atmosphere needed solely because an artificial environment does not provide the "hand-on" atmosphere that computers demand. (I cannot envision children being taught keyboarding with a replica of a keyboard being

reproduced for them using a photocopier, and then having the students go through keyboarding drills by placing the paper on their desks and having to identify when they make a mistake by touching the wrong key. To familiarize the student with the arrangement of the keys on a keyboard would be one thing, but the student could hardly experience the tactile feel of the keyboard itself.)

Thus, when we examine computers in the context of learning educators must realize they are dealing with a technology that shapes and frames the place of the classroom and influences the interactions that occur in this place. The technology also finds a place in the classroom in terms of importance. If the system is unreliable, or incapable of presenting quality rich materials, or the teacher does not feel confident in using the technology, the teacher will relegate the system to use as a supplemental resource rather than the main source for instruction on a given topic. In some cases the computer-based technology is seen merely as a "time-filler" and not taken as a very seriously as a vehicle for the instruction of students. There can be no doubt that the multiple and interdependent interactions of the teacher, learner, subject-area, and milieu are affected when computer-based technology is introduced into a classroom setting. Computer-based technology will have an impact on the classroom, and the educator must be able to address these influences through careful examination.

Cycle 3a: Negotiating A Pedagogical Space in the Classroom: Sharing and Control versus Loss of Control

Observations:

In the last few weeks we worked on the final touches of our last unit entitled, "Quality of Life" which examines the effects of technology on the lives of Canadians. The "Quality of Life" section was one of our most challenging units of all the units that were explored. The topic explored the use of technology in society. We found this humorous as we wrestled with understanding a new technology ourselves, and now had the goal of using this computer-based technology to help students explore the influences of technology in our society. We could identify first hand with the lessons we were developing for students in the province.

Reflections

Our first discussions were fielded by comments that the director had made two weeks prior to this session. During our usual reflection on practice, held before our working session, the director focused our attention to a topic we discussed a few weeks prior to our meeting. The topic was on how a teacher creates a learning environment through a process of negotiation between both teacher and student. To describe this collaboration our director had coined the phrase, "a negotiation of structure." Our discussion focused on how a teacher negotiates specific structures with his or her students in order for a comfortable zone of open communication to exist. This negotiation sets up the structures of how communication will take place, boundaries of social respect and deportment and, finally, an understood level of expectation for academics in the social setting of the classroom. The goal of this negotiation by educators is influenced by how they view the learner, and in what environment they feel the student will best develop. Our question focused on how computer-based technology would influence this negotiation.

Tuman's, book *Word Perfect* addresses the changing beliefs about the roles of educators which, he finds, reflects the beliefs-systems that educators hold to about their place in the scheme of things. Such shifts in our beliefs about the function of education in developing literate students is prevalent in our school systems today. Tuman argues that historically teachers were expected to establish a predefined and socially understood level of strict control in the classroom. The sense was that the teacher was the expert and the center of the teacher/learner relationship. Tuman points out that the computer-age is shifting us away from a print-media which was by nature a reflection of this control. Thus, he argues that we are experiencing a shift to a model of the classroom which is reflected in a more unstructured and collaborative perspective of education.

> Implicit in this shift of focus is the belief that the key to becoming literate is not learning the language forms of any one group--not even the academic discourse of teachers -- but learning the general system by which different groups use language for their own advantage (and often for the disadvantage of others). One attains literacy either by mastering one or more of these discourse practices (hence the common use of the plural form, literacies) or by grasping the general social process of domination and control that underlies all language use. Whereas the modern model of print literacy emphasizes transformation and transcendence (getting beyond the limits of one's present state and one's own group), the postmodern model emphasizes negotiation and social construction, or, as expressed in the college strand of the English Coalition, 'that the arts of

> language (reading, writing, speaking, and listening) are social interactive and that the meaning is negotiated and constructed' (p.25). The report itself refers to this new, postmodern sensibility as the 'collaborative model' and describes it as one where the teacher acts as an informed and challenging coach, offering multiple perspectives, while students practice and experience the kind of cooperation all citizens increasingly need'(p.28). (Tuman, 1992. P.48)

During our group discussions, it became clear that many teachers struggle to relinquish any control over the learning environment to students. There was a fear that to relinquish control was to create an environment of chaos in which no one would be able to learn. Other teachers expressed they were not sure where to strike a balance, and therefore they felt this learning space should be mandated by the teacher. What became important to the teachers in the discussion was finding a "comfort zone" in which they felt they could intervene when necessary in order to direct discussions, and ensure adherence to rules in order to protect all the students in their classes. We then asked the question whether computer-based technology would effect this environment. While computer-based technology could offer specific guided structures to learning, teachers had to also be willing to test their level of comfort in utilizing computer-based technology for negotiating a learning environment.

Many questions began to rise from our discussions: Does computer-based technology change the discourse in the classroom? Does computer-based technology shift pedagogical relationships? What is my role as a teacher in the classroom? And, finally, What structure of power have I established in my teaching style? Do I feel the need to control the class and be the center of instruction, even given a setting of using computer-based technology? Would computer-based technology challenge me to shift my understanding of establishing a learning environment?

As we discussed the nature of the classroom and how a teacher negotiates a specific order and system in the classroom to establish a learning environment, we began to explore how a computer-based technology system must also be negotiated by educators to establish a learning environment for students. These questions provided a vehicle that led to new discussions about our personal practice as negotiators in the classroom. Another topic that grew from these discussions was how teachers dealt with controversial issues in the classroom. We found the two topics were similar in many ways.

Cycle 3 b: Dealing with Controversial Issues in the Classroom

A Need for Instructor Control: Would the technology get in the way?

Observations

In our last meeting, we discussed the nature of dealing with controversial issues in the classroom. Our debate centered on what we perceived to be limitations of the system to deal with material the teacher could not readily access. For example, it was suggested that we show students specific pictures in which a social issue was presented. The students would examine the pictures and come to some conclusions about the nature of the issue, implications about the issue, and how they could address the issue. One team member stated that she wanted more control over this specific element of the project as she stated that her students would simply see this as a vehicle to make questionable remarks that might hurt other students. As we began to talk we, at first concluded that the system, if left unchecked, would present an ethical problem for us because some students, left without the social accountability, would simply abuse the freedom of speech. Whether the student acted without direct intent, or mistakenly was insensitive, in both cases it still left other students with a greater potential of abuse; and this, as teachers, we did not want to risk.

This opened our debate on how computer-based technology could be viewed as an intruder in our classroom From this open question many other personal subjects emerged. One teacher pointed out perhaps the problem was her own teaching style. She began to discuss how she felt she was open to debate, yet very much reluctant to yield full control. This led to a discussion on teaching styles and how, as teachers, we must find a comfort zone, especially when dealing with what is perceived as a delicate social issue. By retreating to our zone of comfort, we found that all intruders -- especially a machine that could not read the reactions of the students as they addressed the materials--were threats to the learning environment established by the teacher. Upon further discussion, we began to ask and think through what really made us afraid.

It is important to understand that our teaching style and classroom management style are interconnected to what we believe about our roles as teachers and the goals we have set for our students.

Personal Reflections

Tuman, in addressing the influence in a teachers' beliefs about this interaction in classrooms, directs his readers to consider the work C.A. Browers and Eugene Provenzo. Brower's and Provenzo's argue that there is a belief that computer-based technology will break the traditional roles of educators in the classroom. The sense is as Tuman suggests "computer-based teaching represents a revolutionary breakthrough in this pattern of control." The control he speaks of is the traditional hierarchy that exists in teaching reading and writing to students--Tuman suggests here that teachers have taught from a printed text paradigm which creates a polarization between "author" and "reader." The teacher takes on the role of the author--the expert, whereas the student is relegated to be the "learner" and has little to contribute to the greater knowledge center--the teacher. Tuman suggests that hypertext [Computer-Based Technology in the sense of what the system is capable of producing in relation to text] will in a sense shift this social order in the same way it moves present literature from its foundation. While the question being asked by the group came from quite a different aspect, it is interesting that the group discussion began to inquire about the influences and place of the teacher in the classroom. Computer-based technology drew us together to ask important questions in the context of a world that is shifting in social structures due to a change in the presentation of text-based learning resources as Tuman indicates.

> In continuing to dominate the writing classroom, the traditional composition teacher is regularly pictured as an agent of control--of students' actions, words, and thoughts--while the computer, contrary to Asimov's fantasy, is pictured as a tool of empowerment. Someone from Asimov's generation may well be surprised by this switch of roles, although educators like C.A. Browers (1988) and Eugene Provenzo (1992) do continue to warn against the totalizing, panoptic, powers of computers to monitor the entire learning process, especially to keep tight control of all student records. Computer-based reforms of the writing curriculum are thus connected to a larger ideological association of the teacher--and not technology--with the same top-down hierarchical control that leads to the suppression of dissent, diversity, and minorities throughout society. Accordingly, for Cooper and Selfe and other critics of traditional instruction, new forms of computer-based teaching represent a revolutionary breakthrough in this pattern of control; they do for the classroom what hypertext does for reading--removing the author/teacher from the middle, allowing readers/students to pursue their own interests.

Furthermore, Tuman points out that perhaps teachers have for too long become accustomed to being oppressive social agents whether consciously or not. Tuman points out that writers like Cooper and Selfe and other critics of traditional instruction have pointed out that computer-based technology will provide a more open forum to address specific problems like racism, sexism, ageism, and classism. Such writers felt that, given the shift in the hierarchical aspects of literacy, each student will be empowered to engage in meaningful dialogue about these issues and will in effect be positioned to enter such debate on a more equal plain than ever before. Such a discussion is interesting and proves the importance of educators having an opportunity to explore the nature and influence of computer-based technology in the classroom. Thus, the debate moves from merely a technical sense to an ontological sense of what directs our decisions as educators.

> The implication here is that teacher-centered instruction, regardless of its content, intention, or skill, extends oppressive social forces, isolating individuals from one another and emphasizing the deficiencies in what they produce (their product), and in turn that increased reliance upon the technology of computers will result in a diffusion of power to students and presumably, to readers and to citizens at large--presumably for everyone's benefit. The computer, not classroom teacher, is an instrument for the 'increased levels of intellectual divergence and dissent' that Cooper and Selfe argue 'balance our impulse toward status quo'. 'If we can't eliminate the effect of racism, sexism, and classism in our traditional classrooms because of social inertia,' they conclude, 'we may be able to set aside smaller electronic spaces in which such problems can find expression and be debated' (p. 867). (Tuman, 1992, p.p. 82-83.)

Back to Our Meeting

Leaving our last meeting our group felt the difficulty of addressing controversial subjects in the classroom. This had been, I believe, the third attempt at completing a section on "Quality of Life." Each time we approached the topic we either avoided controversial issues or created more issues. We discovered a tension between presenting realistic issues, avoiding stereotypical responses, or creating an artificial environment in which controversial issues were shaped to be appropriately controversial -- in reality, they usually became non-issues.

We attempted to approach the section using a game approach. This posed difficulties as we attempted to construct a representation of the "average" Canadian. Each time we created a fictitious character we found it difficult to place this person in a region

in Canada and also found that given a computer-generated scenario for this person it merely established or reinforced stereotypes. For example, the computer generated a scenario where a First Nations child living in Northern British Columbia was caught for a home break-in and theft. The computer asked how each participant would use or not use technology to deal with this problem. Our fear was that educators using our resource material might construe that we were saying that First Nations Peoples are typically involved in crime. The computer randomly chose the geographic region, the ethnic group, and the issue; however, such a random feature posed ethical problems for us to solve. Our dilemma continued as it appeared any scenario identifying an identifiable minority appeared problematic. If we took away all allusions to sex, ethnic origin and age, occupation, level of education, and economic and or social status we were left with a non-person. We faced an impasse. The more we attempted to move around the problem the more we became frustrated.

In our next meeting, we approached the subject from a totally different perspective. Beginning with pictures of Northern communities we began to come to the lessons from a totally different perspective. The pictures were alive with color, with life, laughter and happiness. Children were playing; elderly people we laughing; the world seemed to take on a new perspective.

We found that pictures allowed us an avenue for free discussion where students could deal with issue-based problems in manageable ways. The pictures were bright and attractive. They depicted life in the North in a positive way in which the use of technology was evident. I remember a picture of an Inuit elderly couple travelling together on a quad machine. They are wearing their native ceremonial dress. Such a picture juxtaposed the influences of modern technology on the traditional life styles of our native peoples. We felt that such an approach was simple, and could still open the avenues. It was also pedagogically sound in terms of supporting the inquiry model.

We talked about how easy this was, and pondered why we had spent three weeks plodding through what appeared to be an impossible barrier in our project. During much laughter and light hearted discussion we proceeded toward our goal of completing the section on "Quality of Life." For the moment our quality of experience had increased ten fold.

Personal Reflection

I believe that our struggle was difficult at the time, but valuable. It required each group member to come to grips with teaching controversial issues in the classroom. Our

concern centered on students, teaching methodologies, and pedagogical beliefs which influence our methodologies. We addressed classroom control and discussed the struggle of creating a world in the classroom that was sterile and removed from actually facing social issues. In a sense, we were examining an inquiry model of instruction but with built in constraints due to the limitations of computer-based technology. Was this truly the model of inquiry we wanted to promote? The experience offered a time to examine our daily pedagogical practices and our comfort zones. In later discussions we wondered if this also gave us insights into the nature of questions teachers will ask when this technology is brought to them and they are asked to incorporate it in the classroom. We wondered if our dilemma might well have happened too early in our discussions. We also wondered if some of the stress a few of our members faced during our meetings was avoidable. We wondered if the level of self-evaluation had become to personal and had come too soon for we felt, as a group, unprepared for the level and depth of questioning that had been shared at the time. The frank, open discussion had brought tension to our group. We realized later the importance of establishing a supportive atmosphere at all times. We felt a supportive atmosphere had not been present simply because we had not prepared ourselves for this level of discussion at this point in our project. I determined later, the process of experiencing tension within a group was helpful in becoming aware, as a researcher, of some of the unintentional issues that can arise out of collaborative research.

I state this because members felt some of our discussion and questions focused within the group directly attacked their teaching practice. Personally, I did not feel this way, but an atmosphere of defensiveness was developing during our sessions that strained relationships during our meetings. Though we realized that the technology and program was problematic in some aspects, it appeared that we kept skirting this dimension not to step on other member's toes. Yet, I believe the discussion came as a result of moving toward a completion of a project that now demanded invested interest. The project also demanded specific questions to be asked. We could not avoid this; however, it was hard to articulate our concerns because they were unknown. Second, to articulate concerns meant that we, as educators, had to examine our personal practice and use it as a guide to examine the technology. The question was no longer what effect the system would have on others, but rather what affect the technology had on my teaching practice. The questions had far-ranging affects. Altrichter, Posch and Somekh suggest that the final result of such debate helps a larger group of educators in the long run.

In analyzing our own experiences and reporting them, you make it clearer

> to others where you stand and why. We do not want to over-estimate the importance of rational arguments in public debate, but we believe teachers would strengthen their ability to shape educational policy and improve conditions in schools if their voices were more often heard presenting well-argued reports on professional matters. (Altrichter, et el. 1993, p. 177)

From these questions our group dynamic shifted from a group that came together to share ideas about a project, to people who were beginning to openly examine their beliefs about teaching. This opening up created a natural tension, perhaps as was suggested by some members, an unavoidable reaction to the depth of our inquiry. We struggled at times as a group, yet somehow in opening up our discussion we gained valuable insights into teaching practice as it related to computer-based instruction. This group discussion prepared us for the next stage of our project, namely, field testing.

Cycle Four: Field Testing Decision

During our final days of meeting, our group leader gave an overview of the direction our discussions had taken. It appeared to us that, as teachers, it had been a valuable experience to examine our practice as we worked on this project. We also realized that, if our group struggled with aspects of this technology, it was possible that many educators would also struggle to understand and equip themselves to use the materials in the context of their own work. In this context we suggested that the initial contact with educators be done in a collaborative discussion research model. We wished to avoid seminar or workshop approaches, especially those that follow the model of a top-down approach where information is passed down from those who know what is best for those who need information to use the system. As teachers we wanted to give other teachers the opportunity to ask questions that would allow them to formulate paths that would reflect their concerns, teaching styles, and familiarity with computer technology. We were concerned that educators begin to examine the nature of their classrooms and feel comfortable to either reject or accept the material for use in their classrooms. We also felt that the process of research we had pursued would help educators examine the technology in a pedagogic context that we believed had been overlooked in so many producers of resource materials for teachers.

These concerns were supported in a report presented about the development of CMI (Computer Mediated Instruction) materials. (Baker, et el. 1997 p.3) From this report three specific recommendations are mentioned which are paramount in allowing teachers

to address teacher language to computer-based technology: 1) making sure the computer and software resources were available to stakeholders; 2) ensuring that an infrastructure in which procedures and knowledge needed to run the materials was present and that the material was provided on a regular and predictable basis; and, 3) that a collaboration necessary to make CMI materials relevant to instructors and students be placed as a priority. This final collaboration is essential if educators are to be asked to provide computer-based technology training in their classrooms.

> The basic idea behind the creation of Academic Systems was to bring together under one roof: i) the enabling technologies necessary to develop instructionally effective CMI materials; ii) the organizational infrastructure, procedures and disciplined behaviors necessary to develop these CMI materials on a regular, predictable schedule; and iii) the sensibilities, expertise and commitment to collaboration necessary to make these CMI materials attractive and useful to instructors and their students and the acumen to achieve these complex objectives while building an organization capable of making effective use of its limited supply of equity capital. (Baker, et el. 1997 p.3)

It was important to our group that teachers be treated as professionals who have valuable insights into the development and introduction, or rejection of specific teaching mediums in their classrooms. Thus, the process of observation/reflections helped me understand the nature of my beliefs in teaching and set the framework to help me to continue my exploration of my initial question: "How do my assumptions and notions of technology effect my teaching? The exploration helped me to address many questions I had about my teaching and allowed me an opportunity to develop a sense of the impact this specific technology would have on growth as a social studies teacher. The questions moved me beyond the "technical correctness of what computers can and cannot do." (Apple, 1986, Tuman 1987, p. 153) to a larger scope of understanding that teaching must move to a larger context which embraces the common places as mentioned before: teacher, learner, subject-matter, and milieu. At first, many questions appeared to draw us away from the initial inquiry; nevertheless, through observation, reflection, and pursuing an understanding of our action our group discovered that each question spawned new interests, new understandings, and new directions and eventually spoke to our initial inquiry. In this context the Jean Talon project guided me toward unfolding of my initial question.

Final Question Articulated

I am aware that, in my own classroom, I have had little computer technology use integrated into my daily practice. As I viewed this, I became aware of the process of change. The government of Alberta has given us the vision for tomorrow with its hope of providing teachers inroads to the Internet. It is surprising that the same questions our initial Jean Talon report discovered were never fully looked at. The question continues for me on a more personal basis. I find it interesting that the government is directing all schools to make technology plans but very few places are articulating how they will use them in the context of daily teacher practice.

Will such technology be placed for the computer teacher to handle? I believe teachers wish to use technology in the classroom, but not until they have been able to formulate a way of approaching computer-based technology will they embrace the technology. In a recent survey conducted by our school, it was interesting to discover that students, parents and teachers all identified computer literacy as important to preparing our students for the future. Yet, according to our teacher survey on computer use in the classrooms most teachers identified that computers were used very little in what was perceived by the teachers as the "serious" areas of study. It was clear that computers were being used in a secondary capacity such as supplementing the core subject areas, or as a reward for completing the initial work in a classroom. While some educators insist that computers can deliver core subject materials and see them not as a threat in any way, it is equally important to know that many educators are reluctant to embrace computer-based technology without being able to examine a number of important questions they have related to their work.

This brings me to the importance of the questions I seek to address. It is apparent that educators seek a forum to ask pedagogically-based questions . My concern is that much of the present work of introducing technology into the classroom has come from a perspective that technology is first introduced and then we will mould educators and students are shaped to use the material successfully in the classrooms. Arden Rauch presents this notion in his paper entitled, "Beyond the Hype: Planning for Computer Telecommunications in the Classroom." Rauch, like many educators, sees potential in the integration of computer-based technology into daily teacher practice. He recognizes the changing role of the teacher, and feels that such computer-based technology will enhance the learning experience of the learner.

> Computers are not a threat to the teacher (although the role of the teacher must change when using them), but computers may threaten the chalkboard. Computer technologies allow professionals to share with students tools that we use daily. Further, as educators, we can provide guidance to help students develop meaningful ways to construct their own knowledge, much as we ourselves do. (Rauch, 1996. P.6)

My argument is not to focus on the debate that exists between the merits or non-merits of computer-based technology. My focus instead is examining the process that will allow educators to examine questions that surface from their daily teaching experiences. I am concerned with a model where the teacher is viewed only as an extension of a technicist view of education. In most cases the view of the teacher is orientated toward a facilitator, or an intermediator, who uses the equipment to present materials the computer can convey. My concern is that the model suggests that teachers accommodate their practice to fit the technological paradigm. Educators should be afforded an atmosphere in which they can provide input into what they need. Teachers have years of experience working with children. Each teacher views his or her class unique. If we are to see technology introduced into the classroom, perhaps it must begin with a dialogue in which the pedagogical concerns of educators are met. I believe that the classroom is a mediated spatial arrangement in which learning is negotiated between learner and instructor. If teachers are to be afforded an opportunity to examine the questions that arise in their daily practice from such negotiations they must be given an opportunity to hear their own voices, and the voices of other educators to acquire the knowledge to progress in their professional careers. As Ted Aoki states:

> We see any story of the lived experiences of teachers suspended, like a tip of an iceberg, itself embracing traces of both objective meanings and lived meanings. As in any story of human experience, inevitably there is present objective meanings of the ontic situation in the form of factual information of the situation within which the stories even occurs. Stories vary, of course, in the weight of the lived experiences, but as long as a story is of human experience, in one way or another, they surface in the text as experienced themes. These themes become a threshold that may allow an unfolding into the deeper realms of lived meanings. (Aoki, p.9, 1985)

Some present strategies to bring teachers to technology do not recognize the teacher as a resource of knowledge, and thus the teacher is instructed to accommodate the space without being afforded the opportunity to be part of the dialogue that will address the concerns of an educator. It is important to have a process to allow teachers to examine the place in which the pedagogical space is negotiated with the learner in terms of strategies to accommodate the needs of both parties. Without this process of negotiation,

the story or narrative is being told by someone else, often by someone removed from daily teaching practice. If such a space is not mediated through reflective practice, I believe the computer will always play a symbolic role -- that ascribed because of its social importance, but few teachers will have articulated the role of the technology in terms of pedagogical requirement for the learner. To move technology from being the "play thing" or the "intruder" teachers must ask questions which will address pedagogical relationships.

Finally, as the title suggests, my major concern in education today is that computer-based technology often draws us toward a language of the computer-technician. While in some ways this is important and relevant -- we need to learn the universal codes that help us operate the machine; however, this research is not solely focused on this language. My focus as established in my title is not: Teacher Technological Language, or Technology Language for Teachers. Each suggests a different paradigm of reflection and choice of questions to pursue; I am concerned with the educator in the role of teachers... their common places: teacher, learner, subject matter, milieu. My focus is teacher language toward technology. My concern is the pathway that leads to pedagogical sense of teaching in a technological world. Specifically, my desire is to explore the language of teachers as they reflect upon computer-based technology being brought into the classroom. I wish to provide a basis of reflection, and indeed as I have ventured to become computer literate as a teacher it is my experience that questions are being asked, but few addressed.

CHAPTER FOUR

THE THEORY OF METHODOLOGY IN THE RESEARCH DESIGN

The following chapter establishes the basis for the methodology that will be used to explore teacher language toward computer-based technology in this research. The chapter provides an overview of four areas of theory which are important in establishing the basis for the methodology employed in this research. The four general areas include: 1) Moving Toward the Openness of the Question—an exploration of the work of Gadamer in establishing the open question; 2) Moving Toward A Philosophy of the Educated Person—a review of literature as it relates to computer literacy including such writers as Solitus and Fenstermacher, Dewey and Tuman; 3) Moving Toward Reflective Practice—an overview of the history and theory behind action research as established by such writers as Lewin, Elliot, Kemmis and McTaggert, and Carson; and, finally, 4) Moving Toward the Interaction and Interdependency of Commonplaces—which provides an overview of the work of Schwab and Schubert and establishes the basis for organizing the themes that would be extracted from the data. The research model orientates the reader toward examining teaching practice in the context of the interaction and interdependency that exits in the commonplaces of teaching.

* * *

Theory of Methodology

In the previous section I explored the process of coming to the question. The unfolding of the question was shaped by many factors including the preliminary studies that were conducted, a wide selection of readings which explored many different paradigm orientations, and a variety of readings in which I examined many different methodological designs. It is interesting that while the question shapes the methodology: the methodology also shapes the question. Thus coming to this section on methodology is a journey into an understanding of the philosophical, epistemological, and ontological frameworks embedded in the question that need to be considered when pursuing a question that will evolve into another level of understanding.

The following reflective overview of the theory is foundational in understanding the question and the development of the methodology used to shape the question in this research project. The overview will include four general areas of theory: 1) Moving Toward the Openness of the Question, which is a discussion about the hermeneutic and epistemology frameworks that directed the researcher to make considerations in terms of

reflective and collaborate basis for questioning; 2) Moving Toward A Philosophy of the Educated Person which discusses the notion that to pursue the question, the teacher must understand the philosophical nature of teaching and how it affects teacher practice. Within this philosophy lies the notion of what it means to be literate, and how the notion of literacy has attached itself to technology; 3) Moving Toward Reflective Practice which addresses the notion of the teacher as a source of knowledge. It also explores the structure of action-research as an influence on the methodological design of this research. Action research will also be explored in terms of it being an agent of social change and efficacy for teachers in the field. The notion of the hermeneutical cycle will also be explored and applied to the present research design; and, finally, 4) Moving Toward the Interaction and Interdependency of Commonplaces which explores the research model of teacher narratives, and how the teacher can find a voice toward technology. The research model orientates the teacher toward examining teaching practice in the context of the interaction and interdependency that exits in the commonplaces of teaching.

Moving Toward the Openness of the Question

Many educators are reluctant to openly welcome new technology into their classroom simply because they have not been given an opportunity to explore the device in terms of understanding how the device can be used, how it relates to teaching styles, how it affects student/teacher interaction, and finally, what effect such technology has on students. These questions originate in practice and come from a desire to know something more about the technology before it is brought into the classroom. This inquiry sets the stage allowing the openness of the question by the teacher.

> People who think they know better cannot even ask the right questions. In order to be able to ask, one must want to know, and that means knowing that one does not know. (Gadamer, 1989, p. 363)

In this context, teacher language towards computer-based technology attempts to direct the educator toward examining computer-based technology. Without such a paradigm shift, technology will remain in the realm of the intruder and will be met with much resistance simply because the teacher has not been given an opportunity to reflect upon what the technology will mean in the context of daily teacher practice. Teachers are concerned with availability of space in their classrooms, limited time to set up equipment, reliability of equipment, and preparation time to use the equipment. These areas focus

merely on the use of the machine. Other philosophical considerations will take even more time for the teacher to consider. Without accommodating the questions teachers are concerned about, the technology takes on little meaning to the practice, because it is either avoided for other more available methods, or it is resisted or rejected as being too time consuming and unreliable to change already proven methods. Unless relevance is found in the context of the individual teacher's practice, little will change in terms of using a computer the context of such daily practice. Thus, the methodology must be structured to allow teachers an opportunity to explore and become comfortable with the technology they are to bring into their classrooms.

It must also be understood that each teacher will approach change, including the changes technology will bring individually and uniquely. This recognizes the autonomous nature of teaching. Teacher's are often isolated from other educators most of their daily practice hours; therefore, a methodology must allow teachers to formulate a variety of ways to broach the subject and understand that a variety of interests will branch from the initial question simply because teachers are often at different places in their teaching careers. For example, a teacher familiar with computer-based technology and presently at a stage in their teaching practice where they are focused on the learning style needs of their students may have questions that focus on philosophical perspectives of the learner and how the introduction of computer technology into the class may help some learners while disadvantage others; similarly, other teachers who are at other junctions in their teaching experiences and who are not familiar with the computers may be solely concerned with how they can familiarize themselves with the computer technology, so they can use the machine in one of their classes. Teachers may begin with the same question, but they will follow paths that interest them at the time.

Each question will spawn new questions; thus, the cycle of exploration built within the methodology will allow teachers to examine teacher practice, reflect on the practice, and then evaluate the practice with the knowledge that has been attained and move toward setting some new strategies that will help shape future practice. This reflective practice continues through many cycles. Reflective practice allows each participant to examine a specific question. Yet each participant is able to direct the question for his or her specific teaching context. Each participant can examine his or her action and then follow the cycle of observation, reflection, and then a re-evaluation of the action to understand the action more clearly. The participants then can move together in a collaborative effort to examine each other's work, yet at the same time learning from the other person's experiences.

Through this structure of methodology a participant can ask what may be

perceived at first as "the stupid-type-question." The environment of wanting to know more allows the teacher to feel safer asking the question, as it is not the person best at discourse here that will be important. Actually, it is important to realize that the question must be fielded so others can be encouraged to pursue knowledge. Altrichter (1993) suggests that the question should be fielded, then brought through a collaborative exchange of ideas with other teachers. Once the question is addressed and an action to deal with the question is developed, the process is recorded and then reported to others. This process builds confidence in the decision-making process to both the original teacher who fielded the question, and to those who have been part of interacting within the collaborative network, and finally to those who have similar interests in the teaching profession.

> Reporting is an important final step in realizing this aim: it saves knowledge and insights from being forgotten in two senses of the word: by reporting and communicating your own experience you root it more deeply within your own memory, as well as making it available to other teachers and the professional community as a whole. (Altrichter, et el., 1993. p. 176)

Throughout this process, it is important that the question remain open because a question can be quickly closed by merely framing it in a way that will not lead to further inquiry, but will direct the response to the question into a state of correctness. For example, a question might ask: As you use the computer in your classroom, how much more student interactions do you notice? Now the question assumes a number of underlying premises. First, it assumes this may be an important question for the teacher to ask. Second, the question already suggests an outcome -- student interactions will increase. Third, it assumes computers are in the classroom. While the question may well come from teacher practice and may be relevant, it is important that the question not be framed. It must be constructed to remain open. A better first question might be: Does computer technology increase student interaction in the classroom? The key is that the question remains open, and that the question originates in the context of the individual teacher's practice. In this way, a question may sound awkward or stupid, but it is fielded in an open sense to find what the teacher is seeking. The question will evolve in a sense if the question is structured to remain open.

The question can feel awkward because in order to ask the question, especially in the domain of computer technology, the teacher may have to learn the codes associated with the technology. Words like network, download, upload, cache, link, boot, and saving

take on specific meanings when associated with computer technology. Teachers who do not feel comfortable with these definitions often feel at a loss to ask the questions that might help them examine their teaching experience in the context of computer-based technology. However, as Gadamer suggests, the very nature of the question understands that the questioner is limited and that the dialectic approach does not always bring us to the knowledge we seek. The key is found in the notion that one wants to know. It is in the wanting to know that the true nature of the question is revealed and the question takes on a direction to acquire the knowledge that remains unknown to the (questioner) teacher. Gadamer calls this keeping the question open. That is, the question is shaped to find the information being sought and is open to the possibility that the question will lead to knowledge relevant to pedagogical practice. Postman also supports the importance of the openness of the question: "Questions, then, are like computers or television or stethoscopes or lie detectors, in that they are mechanisms that give direction to our thoughts, generate new ideas, venerate old ones, expose facts or hide them." (Postman, 1992)

Gadamer makes the distinction that openness does not suggest that any possibility exists, rather openness relates to the question finding a path to what is being pondered. The question must remain open for this process to work. It is in this openness that more questions (knowledge) emerge and the question begins to reflect the true nature of educator concerns and inquiry.

> It is clear that the structure of the question is implicit in all experience. We cannot have experiences without asking questions. Recognizing that an object is different, and not as we first thought, obviously presupposes the question whether it was this or that. From a logical point of view, the openness essential to experience is precisely the openness of being either this or that. It has the structure of the question. (Gadamer, 1989, 362)

Teachers come to the debate with specific understandings of their teaching practice; teachers are the sources of knowledge; teachers' questions come out of teaching practice. Openness allows educators to pursue the knowledge that is related to pedagogical practice, but because of a limited understanding of computer-based technology in this context, the knowledge that teachers want related to teaching practice tends to allude them. Gadamer states:

> The essence of the question is to have sense. Now sense involves a sense of direction. Hence the sense of the question is the only direction from which the answer can be given if it is to make sense. (Gadamer, 1989, p. 362.)

> Discourse that is intended to reveal something requires that thing be broken open by the question. the path of all knowledge leads through the question. To ask a question means to bring into the open. The openness of what is in question consists in the fact that the answer is not settled. (Gadamer, 1989, p. 363.)

Without this process it is conceivable that computer technology will be seen as a device--an instrument, a vehicle impeding the teacher's instruction--another time filler. In response to this concern, the methodology of the research must recognize the nature of questions. The research methodology must also recognize that technology will shape teacher practice, and teacher practice will shape technology. The research must address the interaction that will lead to changes in practice that will face the teacher. Consequently, the research methodology must afford teachers opportunity to be free to ask questions that originate in the context of their own practice. Second, the methodology must help teachers examine their practice in the context of realizing that new knowledge will effect teaching practice, and teaching practice will lead to new knowledge. This cycle of question, plan, change, observation, reflection, and then question is the foundation of this research methodology. It is the link to keeping the question open that allows the teacher to apply the knowledge that is acquired to daily teaching practice.

Moving Toward The Reshaping of Literacy

As with any age, the school classroom has not been able to escape the pressures of a changing world. Technological advancements have not been excluded from the educational system, nor am I arguing at this point that they should. While the education system has played with notions of being innovative, it has historically moved with caution in an attempt to determine what is beneficial for the students and the society it influences from that which is considered merely a "fad" which has limited value in the larger scheme of educating students. As with all eras, technological advances influence all of society and eventually creep into the last bastion of the past: rote learning is replaced by textbook, chalk and slate are replaced by paper and pen; blackboards are transformed into green chalkboards--now white, and traditional educational approaches are challenged by progressive theories. Technological changes do not merely affect physical components of education, but also challenge the very philosophical framework in which curriculum theory and daily teaching practice are influenced. Each change brings a new definition of what it means to be "educated person." Similarly technology

has shaped what our understanding of what it means to be "literate." These two redefining of terms are important to examine because they are the philosophical basis in which teachers understands their purpose in educating the learner, and the foundation which educators use to support their choices and styles of engaging the learner. (Fenstermacher, and Soltis, 1986.) It is no wonder that the modern classroom is being directed to accept change in which computer-based technology is being touted as an important element for the preparation of literate people in this era.

Myron, C. Tuman's book *Word Perfect* discusses the debate among scholars as to the effect computer-based technology will have on the notion of being literate in today's society. Tuman specifically addresses the context of hyper-text in which authors provide numerous insights into what they believe the avenue of hyper-text will bring to our understanding of how it will shape the classroom. Tuman points out writers, such as Bolter in his book *Writing Space* (1991) and points out that we are moving into an era where the very "way of knowing" is being effected by the introduction of computer-based technology. Tuman explores the arguments that the computer will shift the very way we examine and look at the world. Tuman points out the writing of Eugene Provenzo who suggests that hypertext will drastically shift the view of literacy but will also directly affect the social orders and constructs of the classroom. The premise is that literacy is a reflection of our social constructs: our social constructs are a reflection of our understanding of literacy. In the past we have defined literacy in terms of a printed text, thus there has been structured within this meaning of text-- a structured and hierarchical way of approaching the printed text: as expert one disseminates knowledge. This view is also supported by Bolter's *Writing Space* (1991) in which Bolter is "stacking the deck, applying the reading experience developed from a lifetime's of exposure to print to a hybrid or literary hypertext, one that in turn reflects its author's own acculturation into print."

As Bolter states,

> The rhetoric of hypertext--and all of us who work in hypertext are guilty of exaggeration--tends to be a rhetoric of liberation. We sometimes talk as if the goal of electronic writing was to set the reader free from all the fixity and stability of print culture. In fact hypertext simply entangles the reader in nets or networks of a different order. (Bolter, 1992)

Tuman in his book Word Perfect (1992) argues computer-based technology is redefining the meaning of literacy. (The presence of hypertext in a document will also

redefine traditional understandings of literacy.) Tuman points out that hypertextual links, as found in many documents today, allow the reader a different way to approach, read, and understand the materials. The printed page is traditionally intended to be read from the beginning to the end: today hypertextual links allows the reader to move through a text in a somewhat random order that is not confined to traditional reading practice. In a hypertext environment, the text can be linked to pictures, and also to other text-based documents which can originate from a number of geographical areas around the world, and can encompass text that was not originally planned to be part of the original document. This is similar to the writing process engaged by ancient Chinese poets. It was common practice for the poet and the calligrapher to collaborate and to create a final direction and placement for the text. The creator of the link in hypertext context, moves the original text beyond the work of the original author. The very nature of these links requires a new skill in reading and writing and redefines literacy in the process. Today to be literate we are not merely talking about a reading of a defined level of printed text, or a defined level of competence in writing; the sense of literacy has broadened and shifted in the very paradigm in which we understood "literacy" in past ages. (Tuman, 1992)

Initially I can see two places of change a renewed view of literacy will influence: first, change initiated by the introduction of computer technology into the classroom will shape teachers' personal views of what it means to be an "educated" person. Teachers' views of an educated person is essential in developing a philosophy of teaching. (Solitis and Fenstermacher, 1986.) I believe educators must explore their view of what constitutes an educated person if they are to address the changing face of education today. Practice guides our philosophy: our philosophy guides our practice. Such a shift will demands another look at educational common places -- teacher, student, subject matter, milieu.

Second, I believe educators must explore how they define a "literate person." Computer-based technology is shaping what we mean by the term. Today, the word "literacy" is often attached to the word "computer." Parents, and business, and society express the desire for children to be "computer literate." What this phrase embraces is still being shaped by society and the education system. A few years ago to be computer literate meant to know how to use the keyboard and how to use the computer for simple work related tasks. Programming of the system was very minimal as few teachers understood programming themselves.

Today, I would argue computer literacy is used to describe a greater number of skills associated to computer-based technology. Society now wants students to move beyond keyboarding, and embrace such skills as being able to use the computer to do word processing, data base management, complex mathematical calculations,

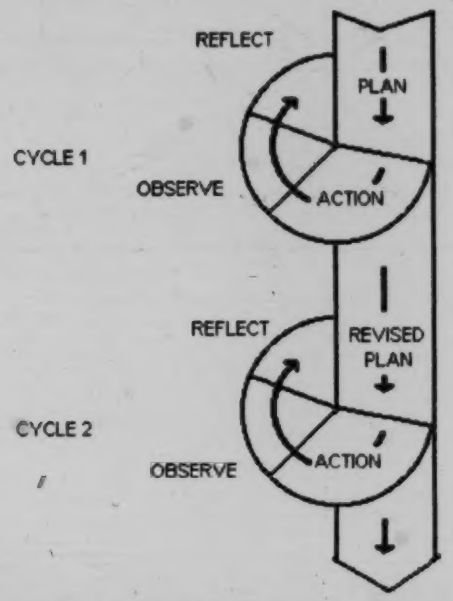
programming in numerous formats and, also, global communications. Computer literacy also has expanded to include such skills as searching and organizing vast amounts of text and visual resources that are available on the World Wide Web. The sense is that computer literacy today is evolving as the technology in computers and communication progresses.

For the teacher computer literacy also takes on a new orientation. This orientation is important to this research project, and is essential to developing a methodology that can extract from its structure the information for teachers to develop a broader sense of literacy. Though philosophical in nature, I believe it is essential in directing teacher practice. As John Dewey states, "...education is the testing ground of philosophy itself." (Schubert, 1998, 116) If teachers are to be equipped to deal with education relating to computer literacy they must be afforded an avenue to examine this issue closely in the context of their teaching practice. It is in this context teachers will be able to develop a philosophy of teaching that will help them examine their practice as it is influenced by computer-based technology.

In a recent study conducted at the school where the research will take place, parents, teachers, students, and administrative staff prioritized a number of important goals for the future of our school. One priority identified was that children need to become computer literate. Computer literacy is seen as an "advantage" in the future society; therefore, it is seen as a vehicle to enfranchise and empower the next generation.

There is a pressure on schools to meet the future needs whether a clear understanding of literacy is understood. Many teachers today are faced with introducing a literacy they have little handle on themselves. While we might agree on some basic understandings -- that children need to learn how to keyboard, or students need to know how to produce databases, word process, etc., it is important that educators and students have an opportunity to explore a literacy that is not yet defined. The key component here for the development of sound teaching methodologies is to open dialogue among teachers, and other stakeholders in the education of students. Through an open process of collaboration, the teacher will be able to articulate and reflect on many aspects of computer literacy as it relates to the development of sound educational philosophy with a recognition of the impact that computer-based technology will have on the educational system. Such a philosophy will provide a guideline and place for continued research and an expansion of related knowledge in the field.

Model of the Action Research Spiral: (from Kemmis & McTaggart, 1981)



> Action research is a form of self-reflective inquiry undertaken by participants in social (including educational) situations in order to improve the rationality and justice of (a) their own social or educational practices, (b) their understanding of these practices, and (c) the situations in which the collaboratively...sometimes in cooperation with outsiders. (Kemmis, as cited in Hopkins, 1985)

The action-research model provides a number of features that address the nature of the question: First, the action-research model provides a context for reflective practice which affords educators opportunities to examine questions in the context of daily practice and to gain an understanding of the purpose behind the choices educators make. Thus, teachers become a source of expertise in the field. Second, the action-research model recognizes the autonomy of the teacher and identifies the teacher as source of knowledge and an agent of change. Third, the action-research model provides a setting for teachers to share in a collaborative fashion. In this context teachers can share knowledge with other educators both as an instrument to address a teacher's own pedagogical practice, and also as a way of learning from observing the practice of other teachers.

The following is an overview of action-research. While the model of action

research shapes some of the methodological design, the methodology designed for this research may not be identified by some as action-research simply because the research begins with a problem, rather than the process of action-research developing a problem to be discussed. The methodology seeks to discover the language of the teacher toward technology in a reflective, collaborative setting; however, by definition the research is focused on a specific area of interest identified by me. I include here an overview of action research as this section provides an overview of the theory that helped shaped the overall methodological design of this specific research project.

What is Action Research?

Writers such as Kemmis and McTaggert argue that action research can be traced back to around the conclusion of World War II. They give credit to this research methodology to the work of social psychologist, Kurt Lewin. The method of action-research has evolved over the years and has encompassed many different fields of study including: science, medicine, cultural studies, social reconstruction, and education to name a few. Despite the debate about the origins of action research, Kurt Lewin, in his book, *Resolving Social Conflicts* (1948) (Schubert, 378) developed a foundation of inquiry which described the process in action-research as "proceeding in a spiral of steps, each of which is composed of planning, action and the evaluation of the result of action" (Kemmis and McTaggert, 1990). Lewin also suggested that for social change to take place, the practitioners must influence and initiate such change. Lewin laid the foundation for the sense that knowledge could be extracted from those engaged in the problem, rather than older models of research that tended to call for experts, outside the situation, to observe and come to certain conclusions. Kemmis and McTaggert define action-research as

> "inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out" (Kemmis and McTaggert 1990:5).

And, Elliot defines action-research as "The study of a social situation with a view of improving the quality of action within it." (Elliot, 1989) Common to action-research is the following cycle of planning, acting, observing, and reflecting.

- **Planning** in which the participants of the research project come together to discuss identified problems which they wish to address.
- **Acting** in which the participants construct and carry out a plan to address the problem that has been identified.
- **Observing** in which the participants examine and collect data on how the plan is working.
- **Reflecting** in which the participants reflect upon what they have observed and make sense of what is being observed. In the observations the participants are to note changes and then record these changes. Reflection is supported through a collaborative effort in which the participants discuss the findings and bring up new questions that arise out of the first cycle. The process is then repeated with a new revised plan placed before the participants. The cycle continues until the problem is addressed. (Adapted from the work by Dr. Terry Carson on Action Research at the University of Alberta.)

In the context of this study a whole component of the methodological design has been shaped toward this model as it is believed that a similar research model in terms of the cycle of inquiry will provide a vehicle to explore the question, while addressing the concerns of triangulation, and concerns relating to validity that are important issues to resolve in any research design.

The Teacher as a Source of Knowledge

Elliot is an important contributor to applying action-research to an educational setting. In his paper, "A Framework for Self-Evaluation in Schools," Elliot identifies what he calls two areas of tension. The first source of tension is found between the current school systems and the public in terms of individual accountability. Elliot points out the desire for the public to find out what was happening in the school system became the impetuous for numerous evaluators entering the classrooms in search of action. Evaluators were seen as experts of research. The common result was that research tended to distance itself from the realities of lived-experiences within the daily lives of the teachers and their students. Consequently, the questions that needed to be addressed were

not being addressed because the very structure and purpose that precipitated the research was unable to address the very questions that needed to be addressed.
Elliot states:

> The teacher knew there was a world of difference between identifying problem situations through an evaluation of review and doing something about them. Working through a checklist does not necessarily stimulate professional development and improvements in practice; even if it satisfies the requirements of accountability. (Elliot, p. 4, 1989)

The second area of tension Elliot observes is that teachers and students in past systems of research design were often examined as objects of research. His concern is that teachers were not seen as resources of a specific knowledge, but responsible only to administer knowledge to students as given by the society they served. In this paradigm teachers were expected to be technicians. Elliot also points out that changes in the educational system were needed. Teachers, students, and the public were all in agreement; however, what changes were needed and how such change could be incorporated were another question.

Elliot continues his concern by suggesting the existence of a link between identifying a problem, solving it and then implementing change. A link must be found between self-evaluation and professional development. Elliot explored a research design that would lead teachers to a cycle of self-reflection, with a purpose to identify areas in teacher practice that were identified by the teacher as areas that needed to be examined, a research project intended to plan such action, and a research design which would allow teachers to evaluate the changes that were taking place. Elliot identified this research model as action-research.

Elliot continued his work by outlining the process of analysis, pointing out that the process of analysis has no ending and is as such not based in action, whereas action research attaches itself to specific concrete situations. Action-research differs in that it is validated through practice.

John Elliot sees research as empowering those engaged in a profession. He suggests that change must be identified by these professionals because they are closest to the needs of the people they work with. In the case of educators it would be teachers, students, and support staff. Once a problem is identified a process of research can initiate, articulate, and help implement the needed change. Change can be understood as having three levels: 1) Change in the curriculum is found by providing a forum to accentuate the voice of teachers. 2) The second level is to move curriculum planning and acceptance of

such planning back to the grass-roots recognizing professionalism and autonomy as important dimensions in defining problems, influencing change, etc. 3) The third level works to develop personal efficacy through personal growth and connection with other professionals in the field and through supplying action to initiate change.

Change begins by allowing individuals to identify areas of need in terms of their daily practice. Individuals purposely moving toward a common collaborative goal of improvement in personal practice influence positive changes within an institutional system. Institutional change brings about positive social change.

Within the context of this study, the process discussed by Elliot can be modified and constructed to direct the teacher to evaluate and reflect upon teacher practice as it relates to computers being used in the classroom. Teacher language to technology is an examination of the process and questions formulated by teachers in the context of their practice. There are differing components here to action-research. Action research is not merely an examination of an issue, but a research that pursues change. I make this distinction here and reaffirm that action-research has influenced this research methodology, but the methodology is not necessarily intended as an action-research project.

Moving Toward the Interaction and Interdependency of Commonplaces

> The teacher's work is carried out by interaction. Although many teachers may think they independently arrive at the daily design of classroom learning, this design is a product of interaction with students, subject matter (policies and materials), and milieu (environmental form and function). Each of these commonplaces continuously reshapes and mediates the teacher's decision. (Schubert, 1986, p.292.)

As Schubert suggests the teacher's professional experience is filled each day with interactions. These interactions are not merely between the teacher and the learner, but also with other influences. When a teacher constructs a series of lesson plans, the plans are not constructed only in terms of general knowledge or theory. In fact, the teacher considers such things as the students they will be teaching, the type of learners the students are, and whether these students work better independently or in various small or large group settings. The teacher will decide on the delivery of the resource materials. The teacher will decide whether a lecture will be used, or a list of notes given with the lecture. A film may be employed. These considerations all go into the planning of a lesson. In terms of subject matter the teacher will want to know which material will be

used, what resources and of course the emphasis or main point of the subject that will be addressed. The teacher must also consider the milieu, what equipment is available for the lesson, chalkboards, overheads, maps, charts, video recorder with television. The teacher must also consider the time of day, and even the day of the week that a lesson will be given. A hot Friday afternoon class, which is one hour in length, does not present the same atmosphere for the learner as a rainy and cool, Tuesday morning class which is forty-five minutes in length.

When teachers make decisions about lesson planning, they consider hundreds of variables. Teaching is a reflective practice that requires examining practice and continually working to improve practice in order to freshly engage the learner. Schubert points out that the work of teachers is constantly renewing itself.

> It results in decision, action, and/or increased personal and professional meaning. This, in turn, brings into clearer sight other problems to be pursued, other needs to be met, and further meanings to be recovered. (Schubert, 1986, p.292.)

Teacher practice has not always been accepted as being relevant research material. Schubert points out that John Dewey's proposals for practical inquiry were met with opposition because it purported to suggest that the "he advocated a curriculum based on student interest and neglected the disciplines of knowledge." (Schubert, 1986, p. 296) Joseph Schwab's notion of practical inquiry was also met with much opposition as it was considered " devoid of sophistication" Schubert, 1986, p. 296). In both cases the senses were that research was to remain in the domain of the "learned" or expert and for social research to be valid, it must be removed from the practice (objective) rather than rooted in the practice itself. This claim was addressed by Schwab. He suggested that unless practice is rooted in practice and that the methodology is not tailored and adapted to the situational needs of the practice being examined by the research then research was not able to capture to phenomena as it exists, but rather isolated only a small portion of the phenomena into an artificial context which presented a distorted picture of the phenomena (Schubert, 1986, p. 297).

Schwab's claim that methodology needs to be rooted in practice is important in the shaping of the methodology that will be employed in this research project. If we are to examine the language of teachers to technology, it must originate in practice, and be provided a context in which the questions can be brought to the surface. Also it is important that the teacher be the agent of knowledge, and that the researchers work as a facilitator, rather than an outside person looking to understand a phenomena that they are removed from.

Another area important to examine is the work that Schwab accredits to Francis Bacon, and that being his work of taking the four common places: teachers, learners, subject-matter, and milieu and creating a chart which provides the interactions of the various common places. As mentioned before a teacher involved in examining his or her teaching practice must consider each common place, but not in isolation. The methodology must recognize that few teaching decisions are made by isolating only one factor. A clearer picture of teacher practice would understand that the many components of the four common places only provide a starting point for reflection, and that the four common places are places of interactions. They are independent, and the combination of one to four common places at a time is closer to a picture of which explains the interaction that exists that influence daily teaching decisions.

Schubert includes in his discussion a series of questions that are "designed as springboards for reflection on curriculum in any educational setting." (Schubert, 1986, p. 302). After carefully examining the questions, I have decided to include a copy of this interdependent chart of questions to facilitate teachers using them as a spring board to familiarize themselves to many aspects of introducing computers in the classroom that are not so commonly thought about, yet are very much a picture of the experience of teaching. The chart can be found in Appendix G.

Finally, the four common places will help teachers reflect upon their teaching experiences, and also provide a way to organize the data as teachers discuss through narratives, and collaborative group work during this research project.

CHAPTER FIVE

OVERVIEW OF METHODOLOGY

The following chapter includes an overview of the original methodology that was planned to complete this research. The methodology was originally examined by my doctoral candidacy committee and suggestions for improvements were provided and included in this chapter. The research was to progress as recorded in Chapter Five; however, a unique opportunity to expand the research presented itself before the research progressed in full. During the initial setup of the research, the school I was working at was in the process of creating a way to have staff involved in the development of a computer-based technology plan. The opportunity to merge this study and combine it with the work of the school presented itself. After a discussion with my advisor and the administration of the school, it was decided to follow the new opportunity which would require that the methodology be reshaped in order to meet both the needs of the school and the direction of this research. I include this chapter as a record of the original methodology that was planned in order to preserve the accuracy of events. Some components of the methodology did not change, such as considerations relating to validity of the data, and also generalizability. Chapter Nine later provides a detailed account of the opportunity that presented itself, and the changes that were initiated as reflected in the methodology.

* * *

Overview of Original Design

The research design was to have included the following: 1) Selection of Participants; 2) Biographical Surveys; 3) Technology/Pedagogy Surveys; 3) Narrative/Collaborative Writing; 4) Collaborative Group Work; 5) Post Reflections; 6) Review of the Data and Organization of the Data into Themes; and, 7) Production and Publishing of Findings.

Selection of Participants

The following is an overview of the selection of participants and different components of the research plan. The teacher participants were to have been selected from the school the researcher is presently employed with in the Edmonton area. Teachers were to have been invited to participate in different components of this research project according to their interest, availability, and time constraints. All the participants were to have been asked to complete a biographical survey which would have provided information on gender, age, years of teaching, and familiarity with computer-based

technology. This information was to have later been used to draw relevant information needed to understand the question.

Participants in the research were to have been be asked to participate in the following three areas of the research:

1) Ten teachers, including administrative staff, from various school settings were to have been asked to complete the educational computer-based technology survey. The questions were to have focused on numerous topics related to teaching practice as it relates to using computer-based technology.
2) Five teachers from the school I presently teach at were to have been asked to participate in a narrative study in which teachers were to have been asked to provide anecdotal stories related to the research question and then work in a collaborate effort to reflect upon their findings.
3) Three other teachers from my school were to have been asked to participate in a collaborative team setting in which teachers were to have formed a group that would be have moved through a number of reflective cycles to address the research question. The research was to have taken place over a six month time period.

I was to have been a mediator/facilitator in this research project with the principal at my school and to have worked with the principal as part of an overall plan to work in the professional development of staff members within the school. I was to have planned to also collaborate with the department head to work as a liaison for the project and as a "critical-friend." The department head was to have been asked to join the narrative and collaborative team settings and provide input and observations.

Details of Research Package

Biographical Information (see Appendix A)

Each participant was to have received a detailed personal biographical form. The information was to have provided a biographical sketch of the participants including the number of years taught, the subject areas taught, age of the participant, gender of the participant, and other pertinent information related to the level of familiarity with computer technology including aspects of years of training, and inservice courses that have been taken. This information was to have provided a context for the teacher engaged

in the research project, while also supplying a resource for the development of questions for future research.

Computer Technology Questionnaire (see Appendix B)

Ten participants were to have been given a series of questions intended to lead them to examine their careers in terms of identifying and articulating how they used computer technology into their classrooms, and also to identify areas and questions that they had either during the use of computers in their classrooms or in the desire to incorporate computers into the classroom. The following three immediate questions were generated by educators and were extracted from my preliminary research dialogues as examples of questions addressed in the survey: 1) Is it important to the education of my students that I bring computers into the context of my subject area and into my classroom? 2) How can I bring this technology to my students in an effective way? and 3) What implications does this technology have on the way I teach and interact with my students? Each question was to have attempted to draw participants into a context to examine how they have thought about and/or, have incorporated computer technology into their daily practice. The technological survey was designed to ask teachers to address topics like literacy, and their view of what constitutes an educated person in the context of technological beliefs held by them. The questions were designed also to ask teachers to reflect on the four common places of curriculum development: teacher, learner, subject-matter, and milieu.

Anecdotal Writing and Collaborative Interviews (See Appendix C)

Five participants were to have been asked to write one or two short narrative anecdotes, using their own words, which described two independent incidents that illustrated some aspect of teacher experience as it related to using computer-based technology in the classroom. The teachers were to have been representative of various subject areas, teaching experience, and grade levels. Teachers were to have been asked to reflect on four topical aspects of their narratives in which they were to have reflected upon themes as extracted from their stories. The nature of this question was intended to encourage teachers to explore some of the successes and trials they faced in developing a sense of coming to technology. They were to have also been asked to meet together as a group of writers and share their stories and their reflections. The participants were then to have been asked to write a final reflection about a specific area that interested them and

that would have come out of their dialogue and writing.

Collaborative Group Active Learning Project

Three teachers, plus the researcher, and one divisional leader (critical friend) were to have been asked to participant in a collaborative group project. Each member of the group was to have been given a research package which was to have included an overview of the research question, a brief listing of the requirements for their participation, and a package of information to help them reflect on specific areas of teacher practice. (See Appendix D) The participants were also to have been asked to meet with the researcher in which the researcher would have provided a summary of the research and would have provided an opportunity for teachers to ask any questions relating to the research project.

From this initial meeting teachers were to have been asked to come to the next meeting with a detailed lesson plan which could be used to incorporate computer technology in their classroom. The plan was to have become a launching point for further discussion with other group members. The participants were then to have been asked to identify goals, objectives, and student activities, as well as reviews that could be used in a classroom setting. During the first meeting participating teachers were to have shared their plans and were to have been asked to field questions that other group members had. The teachers were then to have been asked to modify their lesson plans, if needed, and to carry out the lesson plan before the next group meeting.

Each group member was to have been asked to keep a diary in which they were to have recorded goals, objectives, lesson plans, reflection, and the steps taken to accommodate computer technology into their daily practice. They were also to have been asked to record any questions that would have arisen from their practice. The participants were then to have been asked to meet once a week for approximately one hour to discuss some of the highlights of their plans. At these meetings, participants were to have been asked to identify what things worked and what did not work. They were to have also been asked to share what they observed and questions that arose from their practice. From this collaborative discussion, participants were to have been asked to continue redefining and developing a plan for further action and to again follow the steps taken in the first meeting.

At the end of each month, the teachers were to have been asked to reflect on their teaching practice and to share their findings with the other members of the group. To direct the teachers in reflection each month the teachers were to have been asked to

reflect on a specific common place: teacher, student, subject-matter, and finally, milieu. The teacher's were to have each received a copy of the Common Place Matrix Guideline (see Appendix G) and were to have been asked how their teaching and lesson plans could be understood in the context of a specific area of the matrix. This was intended to have been included in the first cycle of the research.

Each month the teachers were also to have been asked to discuss one or a number of the thematic areas provided for them by the researcher. During this time, teachers were to have continued to develop lesson plans and strategies to use in the classroom. At each meeting the participants were to have been asked to read, or verbally retell, what action they took and the changes they wished to examine in the future. During the group discussions, I was to have helped participants to identify further questions arising from their practice and to encourage them to address these identified concerns in their daily reflective journals. The material from the journals, including the descriptions of lesson plans, observations in the classroom, observations from our collaborative meetings, and reflections would have become one of the numerous sources of data. The data was to have been collected over a six-month period and was to have been added to data collected over a more extensive two year period that lead up to the final collection of surveys at the school.

Data Organization

During the final stages of the research, the data was to have been collected mainly from: 1) biographical survey; 2) computer technology survey; 3) narrative/reflective collaborative writings; and, 4) collaborative group work. The final data was to have been verified through a collaborative process to ensure accuracy. The data that was to have been extracted from the various surveys were organized into four major themes: the teacher, the learner, subject matter, and milieu. Within these themes, a number of common issues were to have been identified and organized into more specific areas of inquiry. These issues were to have been organized so that the data would have reflected the changes and the process of teacher language toward computer-based technology.

A Detailed Look at Research Journal

The participating educators were to have been initially asked to keep a daily journal in which they record a number of different styles of observations. The journal was to have been divided into a number of categories: planning, observations, reflections and questions arising from reflective practice.

- **Planning**: Participants were to have been asked to carefully record the details of their lesson plans throughout the study, including the aim (purpose) of their lesson plans, student activities, and evaluations that are part of the instructional components of the plan. The writing was to have included diagrams, details of resources needed, and time considerations for each lesson.

- **Observations**: Participants were to have been asked to record the observations they made of the lesson as it is carried out in the classroom. Observations were to have included such things as equipment used, seating plans, number of students, subject area, class atmosphere, time of day, etc. Observations were to have included the objective component of the study in which a spatial framework was to have been recounted for later evaluation and reflection. The observations were to have also included an overview of what transpired in the class during the lesson.

- **Reflections**: Participants were to have been asked to record their personal reflections about their interactions both in the classroom and with the collaborative group. The reflections were to have been divided in three areas:

    - **Personal Reflections** which were to have been focused on a dialogue between the writer and themselves. The writing was to have been focused on what they felt about an issue, and how they felt a lesson had gone. The content of the reflection was to have been used to encourage further thought about ideas that were to have come from daily observations.

    - **Theoretical Reflections** were to have been reflective writings which focused on how the writer moved toward theory, either theory that they had already been exposed to or theory that engaged the purpose behind the actions they had taken. For example, if participants wondered how such an activity worked, they may have wished to discuss how such an activity

was supported by a theorist. This reflective writing was to have moved from a dialogue of how they felt about a subject area to a level of discourse in which they logically tried to understand their reasons for engaging in specific teaching practice.

- **Question Initiated Reflections** were to have been reflective writings in which another question regarding practice was unearthed. This question was to have lead to new series of questions in which further inquiry was necessary. This reflective practice was to have pushed the participant to inquire about areas that their observations, plans and reflective practice had identified to them and was to have been of interest to them for further study.

Teachers were to have been instructed to incorporate the use of video and/or audio recording, and/or still photography to enhance their work and to keep track of observations. The recordings were to have been done with permission, which was to have been obtained by the researcher for each of the participants and their related classrooms. Participants were to have been also asked to record the setting, date, time and class of each activity recorded.

Detailed Look at Narratives

Participant narratives were to have been simply the re-telling of stories from the perspective of the observer and interpreter of the event. The narratives were to have recounted what the participant teacher remembered about a specific incident and what he or she learned from the experience or experiences. In the retelling and listening to other stories the narratives were to have taken on new meanings which other teachers could have learned from and which would have directed further reflective thinking about their experience or experiences.

In writing narratives the teachers were to have been asked to write in a style in which the voice of the writer was predominate. In such writing, the writer was simply retelling his or her own personal story. Each participant was to have been then asked to share his or her story with a group of other educators who were to have been instructed to ask questions about the story if clarification was to have been needed. The participants then were to have been asked to re-write any areas of their stories that needed to be clarified. The participants then were to have taken these final pieces of writing and were

to have been asked to write a reflective piece relating to the topic area and addressed by the participant.

Story Number One

In story one, participants were to have been asked to describe an incident in their teaching profession or life in which they felt they were successful in using computer-based technology in their teaching practice. In their reflection, participants were to have been asked what they learned about this specific story about their teaching.

Story Number Two

In story number two, teachers were to have been asked to write about a time in which they faced doubt about whether they wanted to continue or initiate the use of computer-based technology into their classrooms. In response to their story, teachers were to have been asked to extract what they had learned from this difficult experience.

Post Reflection

Finally, teachers were to have been asked to address three more questions as a way of initiating reflection upon the narratives they had provided. They were to have been asked, What advice would you give to a beginning teacher who was concerned about integrating computer technology into the classroom? Has computers technology shaped the way you teach? And, how has the technology shaped your view of the learner? Once substantiated by the teachers as being accurate, the stories and reflections were to have been included as part of the data for the research.

Personal Reflections (Researcher)

During the research, I was to have been keeping my own research journal in which I was to have been recording notes related to my extensive readings on the subject of computer-based technology in the education field. I was to have also been keeping a journal to record notes on my own personal observations and practice as it related to my classroom experiences. During the research, I would have had two specific duties. One duty would have been to construct my own lesson plans and initiate my work within the context of my classes. I was also to have been devoting my attention to a broader scale in

which I was to have been recording my discussions with administration, and my meetings with my "critical-friend." During these discussions I was to have been examining the research objectives, and to have been recording my observations in my personal diary. I was to have been including these records as part of the rich resource of data for the research.

I was also to have been using audio recordings, and pictures as part of my observations both in the context of my own classroom practice and as the group leader of the narrative and collaborative group projects. The pictures were to have been a valuable source of data as they were to have been intended to provide a pictorial record to support other content used as data in the research.

CHAPTER SIX

DELIMITATIONS AND LIMITATIONS

Chapter Six includes an overview of the original delimitations and limitations that were planned in order to complete this research. As mentioned in Chapter Five, I was afforded the opportunity to merge this research with developing a technology plan for the my school. After a discussion with my advisor and the administration of the school, it was decided to follow the new opportunity which would require that the delimitations and limitations be reshaped in order to meet both the needs of the school and the direction of this research. I include this chapter as a record of the original delimitations and limitations that were planned. Some components of the delimitations and limitations did not change at all. Chapter Nine provides a detailed account of the opportunity that presented itself, and the changes that were initiated as reflected in the delimitations and limitations directed upon this study.

* * *

Delimitations

Geographic Considerations

The study was to have been delimited to the geographic area including and surrounding the city of Edmonton. This delimitation was to have been imposed on the study to maximize the effectiveness of the collaborative nature of such a study as it was important for me to have direct contact with participants in the study, especially those participants who were to have been part of the narrative, and collaborative group surveys incorporated in this study. . The geographical delimitation would have affected the generalizability of the research findings by confining the study to a smaller geographic region. However, given the nature of the study, the findings would have been reflecting the experiences of educators both inside and outside the Edmonton area. This was to have been evidenced throughout the research by the record that was to have been provided in the journal readings, personal discussions with educators from other regions of the province about their interaction with computer-based technology, and also records of teacher narratives as found on the World Wide Web. While the narratives from the World Wide Web are not used as direct data (evidence) because it is almost impossible to guarantee authenticity, they do provide a broad picture of what some teachers state about

the integration of computer-based technology in their teaching practice. Each of these sources supported a general commonality of what was being noted in a more controlled and observable study group.

The study was also to have been delimited in terms of a specific location within the Edmonton region. The questionnaire and the technology narratives originally were to have been extracted from a number of schools within the public and separate school districts. (Please refer to changes that occurred during the unfolding of this research project found later on in the research.) However, the participants in terms of the collaborative aspects of the research were to have been drawn from the school in which I am presently employed. The school is a Junior High-Elementary school in Edmonton. The delimitation would have allowed me to access the teaching environment in which the teachers worked and allowed the teachers to interact with each other teachers without imposing on their valuable time by conducting extra meetings outside their school of practice. This freedom would have allowed me to maximize the use of time in each meeting with participants keeping in mind the time constraints imposed by the daily responsibilities of teaching professionals.

Research Sample Considerations

The study was to have also delimited in terms of size of the research sample. Ten full-time teachers were to have been initially asked to participate in the study in which they were to have been asked to complete a questionnaire, a number of written and verbalized narratives related to the aspects of the research, and being participants of a collaborative components of the research project. The teachers were to have varied in age, gender, teaching experience, subject areas, and grade levels. Though a greater number of participants would have provided a larger data base to draw on, this delimitation was to have been imposed upon the study because of the availability of each participant in terms of time, both within and outside the school setting.

The smaller sample also would have made the data manageable given the multiple elements of the research package. The size of the group also would have allowed for the careful observation of interaction between, and with, each participant. The smaller sample provided numerous opportunities to discuss teaching experiences and articulate specific insights relating to the research project.

The nature (research methodology) of such a study would have demanded a lot of time from busy professionals. In order to have had teachers participate in this study it was thought to have been important to delimit the amount of time required to engage in a

narrative study. I felt that delimiting the size of the group involved in the study and limiting the period of the study would have provided the maximum efficiency of time allotted for such a study. Finally, there was and still is a limit on time imposed on the me, as a researcher, as I was and still is involved as a full time teacher at the school.

Time Frame of Study

The final component of this study was to have been conducted during the first half of the 1999-2000 teaching calendar. The research did began in early September 1998 and culminated in late January, 2000; howbeit, with a modified methodology and delimitations placed on the study. These changes will be explained later in the study. This delimitation helped in making the final components of the study manageable. It should be noted the reasons given for the limitations did not change throughout the research. The study was constructed in such a way as to maximize the validity of such a study even in the context of a time restriction.

Logistics

To maximize and facilitate logistics, the computer-based technological questionnaire and narrative responses were to have been conducted on a personal basis given the close availability of contact due to being employed in the same school.

Limitations

The major limitations of the study were effected by the delimitation's that must be placed on such a study.

Numbers

A limitation on the numbers of participants might affect the generalizability of the data in that a larger sampling of teachers may produce more themes which would provide a bigger picture of teacher language to technology. However, such numbers would have made the research unmanageable as it would have required greater amounts of time and travel for both the researcher and the participants. It is also important to note that the research is a picture of the participants in the context of a specific school, and thus the

research makes no claims that it represents a larger picture than is stated in the description of the context of the work.

Selection

One of the greatest limitations imposed by the delimitation's is that the selection of teachers was made because of availability. The study recognized the time restrictions placed upon educators engaged in their professions. I attempted to keep the number of participants smaller and to include only those teachers with whom I had personal and daily contact with in the collaborative component of the study. This choice enabled me to understand the teacher in the context of his or her classroom experiences and allowed me the time necessary to work through a collaborative effort to accumulate and organize data reflecting the teacher's lived-experiences.

CONCERNS RELATING TO VALIDITY

Every attempt was made to ensure accuracy and reliability of the material before it is presented as data. Each narrative, technological questionnaire, and journal entry was verified by a mutual collaborative discussion between the participants and myself. The research participants were asked to clarify any areas in their questionnaires and or narrative responses that were not self-explanatory. I also took time to personally meet with a number of these participants to have them reflect and articulate some of the points they make. Upon mutual agreement as to the accuracy, the material, became data for this research project.

Observational notes, lesson plans, teacher journals, and my own journal also was also examined and reflects the stories and observations of those who were involved in the study. Teachers who used other sources of record keeping such as video tape or still pictures were also asked to indicate the context of the materials and provide a date and time in which the material was recorded. (Ethical procedures in terms of the research guidelines were copiously followed.)

CONCERNS RELATING TO TRIANGULATION

The research used seven different observational perspectives: 1) biographical data collection; 2) technological questionnaire data which will encompass a larger geographical area of participants; 3) personal narrative data which will also be gained

from a larger test number; 4) collaborative related data including dairies (observations, reflections, and descriptions of planning), pictures, and diagrams of classroom settings; 5) pictures , written records, and sound recordings of collaborate meetings themselves; 6) researcher's diary of the research observations themselves; and, finally, 7) a critical friend's use of observational notes taken from formal personal interviews and observational notes which were taken during informal conversations both with staff members and with educators involved in the study.

CONCERNS RELATING TO GENERALIZABILITY

The following research project is an accurate reflection of the beliefs, interpretations, reflections, and insights of the teachers who were involved in the study. The findings reflect a specific group of educators' path of addressing the need for change as it relates to the initial question focus: teacher language to technology. Given the initial studies that I conducted to initiate this research, I believe that the data will support and reflect the general experiences of educators in the field.

CHAPTER SEVEN

THE MEANING OF DATA

The following chapter provides an overview of what constitutes data in this research. The chapter explores the role of the researcher in collecting, analyzing, and contributing to the data in this research. The chapter also provides an overview of the numerous sources of data and the period of time in which the data was collected. It is important to note that this chapter is recorded to reflect the initial intentions and directions of the research. (At this junction, it is important to note that the research data and methodology was modified early in the research due to future opportunities that presented themselves. These opportunities are recorded in Chapters Nine which provides an historical account of an opportunity that presented itself, and how the opportunity required some modifications to the methodology. An account of the influence on the data and modifications to the data is recorded in Chapter Ten.) Thus, I have left this chapter in tact as if I did not know of a change coming. My decision to do this is to recognize the initial intentions of the research design and to record the initial intentions of this research by preserving the initial record of collecting the data in order that the even remain recorded here both historically, and hermeneutically accurate. Thus the chapter records the initial steps taken in the research with the understanding that the research was revised to accommodate future opportunties. The chapter concludes with a summary of how the participants were chosen and how the data was originally collected.

* * *

Hermeneutic Observation

I believe it is important at this juncture to relate how the role of researcher has shifted in this study. When I first proposed to initiate the research in my school, I saw my role as a facilitator and observer of "others" (teachers) in daily teaching practice. As time continued, I realized how my research project, in a sense, has always been really one story though it is also in a sense a story of many participants. The journey I speak of in my research is my own journal to understanding and examining my role as a teacher, my goals, my aspirations, my struggles, and my growth as I examined it in the context of teacher language to computer-based technology in the classroom. I have discovered that my work has become an embodiment of many of my interests, and goals. It is a record of the process of initiating and reflecting upon change in my own practice. While I realize that many theorists and many fellow colleagues have contributed to my work, the

dissertation has become a record of the shaping of a series of questions and indeed the record of the shaping of my practice. When I observed and reread my initial findings and my initial questions, I found that I had recorded a process of growth over time and was continuing to move on in my practice. Thus, the data in this research dissertation has also expanded to include the reflective practice of the researcher. The data as presented in this dissertation is also a picture of an ongoing process of personal growth and personal reflective practice. I recognize it is a picture of a given time of practice, with the recognition that tomorrow the findings will be a basis--a place for the researcher to again reflect and discover new understandings in daily teaching practice.

Thus, the data is comprised of a text based in practice and experience over a given time period that encompasses the beginning and present and future components of this study. In this context, my role as a research voice in this dissertation has shifted from being an observer of teacher language toward computer-based technology, to be engaged in creating language toward computer-based technology. The insights and reflections that I bring to the overall textual record of this professional growth is valuable as a picture of the very process lived in the lives of educators in the process of dealing with computer-based technology in their teaching experiences. I have a new appreciation of the data as a reflection of my growth, and the collaborative growth of my colleagues whom I have grown to appreciate over the years of my teaching practice. The data has come as a result of a hermeneutic cycle of inquiry that makes this record, unique, living and not static. This is why I call the first section of this chapter the Original Sources of Data. This expresses how my relationship to the data has changed, and also it provides the record of the purpose in also gathering the data from many resources. Both sources of data are important, for the data reflects the experience of teachers in the field as they face computer-based technology and wrestle with questions about their teaching practice.

Sources of Data

Teacher Participants

The data in this research project was obtained from written and oral responses that were given by twenty-one teachers presently working at MCS. The data was taken from a number of sources including a series of detailed written response surveys that included the following: a Biographical Survey; 3) Technology/Pedagogy Survey; 3) Narrative/Collaborative Writing Survey; and, 4) Narrative/Post Reflections. In all cases, I also provided input by responding to the surveys as a teacher at MCS.

Details of Picture of the Data

Biographical Information (see Appendix A)

Each teacher participant received a detailed personal biographical form. The information provided a biographical sketch of the participants including the number of years taught, the subject areas taught, age of the participant, gender of the participant, and other pertinent information related to the level of familiarity with computer technology including aspects of years of training and in-service courses taken. This information was used as the basis for data and provide brief overview of the teacher engaged in the research project, while also supplying a resource for the development of future questions for research.

Computer Technology Questionnaire (see Appendix B)

The participants were also given a series of questions intended to lead them to examine their careers in terms of identifying and articulating how they used computer technology in their classrooms. Included in the series of question was the direction for teachers to identify areas and questions that they have either during the use of computers in their classrooms, or in the desire to incorporate computers into the classroom.

The following three immediate questions were generated by educators and were extracted from my preliminary research dialogues and are examples of questions addressed in the survey: 1.) Is it important to the education of my students that I bring computers into the context of my subject area and into my classroom? 2.) How can I bring this technology to my students in an effective way? And, 3.) What implications does this technology have on the way I teach and interact with my students? Each question was formulated to draw participants into a context to examine how they have thought about and/or have incorporated computer technology into their daily practice. The question became the beginning place for further inquiry and, it was hoped, a beginning place for the teacher to engage in examining teaching practice. The technological survey also asked teachers to address topics like literacy, and their view of what constitutes an educated person in the context of technological beliefs held by them. The questions were addressed to teachers to help them consider and reflect on the four common places of curriculum development: teacher, learner, subject-matter, and milieu. The written responses to this survey were included as part of the data in this research project and the initial question was recorded as a starting place for responding to a specific concerns in teaching practice.

Narrative Writing and Collaborative Interviews (See Appendix C)

Teacher participants were also asked to write two short narrative responses in which the teacher participants were asked to describe two independent incidents that illustrate some aspect of teacher experience as it relates to using computer-based technology in the classroom. Teachers were then asked to reflect on four topical aspects of their narratives in which they were to reflect upon the following themes as extracted from their stories: the teacher, the learner, the subject matter, and the milieu. The nature of this question was to encourage teachers to explore successes and trials they may have faced in developing a sense of coming to computer-based technology. The written responses to this narrative response was used as data in this research project. Each participant was also asked to write a final reflection about a specific area that interests them and that has come out of their writing. The reflective responses, as well as future

questions that the teachers address became part of the data in this research project.

The Researcher as a Participant

The participating teachers, as well as the researcher, were encouraged to keep a personal daily journal of teaching practice in which they record a number of different styles of observations. The journal was divided into a number of categories: planning, observations, reflections and questions arising from reflective practice.

- **Planning**: Some participants were asked to carefully record the details of their lesson plans throughout the study, including the aim (purpose) of their lesson plans, student activities, and evaluations that are part of the instructional components of the plan. The writing could include diagrams, details of resources needed, and time considerations for each lesson.

- **Observations**: Participants were also asked to record the observations they made of the lesson as it was carried out in the classroom. Observations included such things as equipment used, seating plans, number of students, subject area, class atmosphere, time of day, etc. Observations included the objective component of the study in which a spatial framework was recounted for later evaluation and reflection. The observations also included an overview of what transpired in the class during the lesson.

- **Reflections**: Participants were also asked to record their personal reflections about what transpired both in the classroom and, if they wished, also in terms of the collaborative group. The reflections were divided in three areas:

    - **Personal Reflections** were writings focused on a dialogue between the writer and themselves. The writing is focused on what they felt about an issue, and how they felt a lesson had gone. The content of the reflection was used to garner further thought and unearth ideas that came from

practice. Many of these reflections were used to answer the previous surveys or treated separately as data in this dissertation.

- **Theoretical Reflections** were reflective writings which move the writer toward theory, either theory that they had already been exposed to or theory that engaged the purpose behind the actions they had taken. For example, if participants wondered how such an activity works they may wish to discuss how such an activity was supported by a theorist. This reflective writing moved from a dialogue of how they felt about a subject area to a level of discourse in which they logically tried to understand their practice.

- **Question Initiated Reflections** were reflective writings in which another question regarding practice was unearthed. This question may have led to a new series of questions in which further inquiry may have been necessary. This reflective practice pushed the participant to inquire about areas that the observations, plans and reflective practice had identified to them and was of interest for them to pursue in further study.

Teachers were also able to incorporate the use of video and/or audio recording, and/or still photography to enhance their work and to keep track of observations. The recording was done with permission obtained by the researcher for participants and their related classrooms. Participants were asked to record the setting, date, time and class of each activity recorded. The preceding journal materials were used as data in this research project.

Data Organization

The data for this research project came from a number of sources: 1) biographical survey; 2) computer technology survey; 3) narrative/reflective collaborative writings; and, 4) collaborative group work. The data was verified through a collaborative process to ensure accuracy. The data gathered from questionnaires, the narrative anecdotes/

reflections, and the various components of the collaborative group work were organized into four major themes: the teacher, the learner, subject matter, and milieu. Within these themes, other questions and themes arose. These themes were organized so that the data reflected the changes and the process of teacher language to computer-based technology.

Detailed Look at Narratives as Data

Participants were instructed on the purpose of writing their responses in narrative form as being another way of simply re-telling stories from the perspective of the being an observer and interpreter of an event. The narratives provided another way for teachers to engage in examining their own teaching practice. Each participant was asked to simply recount what the participant teacher remembers about a specific incident and what he or she learned from the experience or experiences. In the retelling and listening to other stories the narratives took on new meanings which other teachers could learn from and direct further reflective thinking about the experience.

In writing narratives the teachers were asked to write in a style in which the voice of the writer was predominate, and the writing was to take on a style as if the writer were simply recounting the events in the story. Writers were then asked to take these final pieces of writing and write a reflective piece relating to the topic area and which discusses teacher practice. The following is a record of how the form of the narrative component of the research was constructed and how the stories and reflections were included as part of the data for this research.

Story Number One

Describe an incident in your teaching profession or life in which you feel you were successful in using computers in your teaching experience.

Reflection: What does this use of computers in your classroom mean to you?

Story Number Two

Write about a time in which you faced doubt to whether you wanted to continue using computers in the classroom?

Reflection:
What influenced your decision?

Post Reflection

What advice would you give to a beginning teacher who was concerned about integrating computer technology into the classroom?

Has computers technology shaped the way you teach? How has the technology shaped your view of the learner.

The participant teachers were asked to relate personal stories which, to them, addressed the concerns or teaching practices of the computer in terms of their classroom. The stories were recorded in writing and read by a committee of planners. The stories were validated by a discussion with the teachers, especially about areas of their writing that were not clear to the researcher and needed further elaboration. Once substantiated by the teachers the narrative records became part of the data for the research.

Personal Reflections (Researcher)

As a researcher and full time teacher in the context of my school, I also kept my own research journal in which I continued to do extensive readings as well as keep notes on my praxis in a classroom setting. I constructed my own lesson plans and initiating my work within the context of my classes this year. I recorded my personal observations and reflections in this journal. This material became part of the data.

Second, I also devoted a section of my writing to a broader scale in which I

discussed the procedures of my research and the overall observations of teacher practice. I also met with my "critical-friend" to discuss research objectives, observations, and reflective practices.

I gathered data from my divisional cohort meetings where we discussed the basis of our goals and reflections as teachers. I used my time to conference weekly with colleagues engaged in developing a sense of initiating computer-based technology in their classrooms. I also made notes on our conversations. The notes were verified with the participants involved and was used as data in this project.

CHAPTER EIGHT

PURPOSE OF THE STUDY

The following chapter provides an overview of the purpose of the study. The chapter is written in point form and reflects a compilation of work derived from the narratives and theoretical aspects of this study which are recorded in previous chapters in which educators' voiced specific areas of concerns as they examined their roles of the teachers in research. The major purpose elements of this study are outlined as follows:

- **To examine the role of the teacher:** The research study examined the teacher's role as it related to introducing computer technology into the classroom. The study allowed teachers to reflect on the place of the computer in their teaching practice. With the advent of distant education through computer-linked communications, the role of teacher has been changed. The purpose of the study directed teachers to explore the notion of cyber-pedagogical space and its implication for the teacher and the learner. The sense that computers also require a different focus in terms of classroom management, communication with students and arrangement of physical aspects of the classroom was also examined.

- **To provide a methodological framework for teachers to follow in understanding the introduction of computer technology in their classrooms:** The research also provided a methodological framework for teachers to personally ask the questions that they had when introducing computers into the classroom. The model allowed teachers to move from a place of feeling isolated, often experienced in the teaching profession, to a place of interaction with other professionals facing similar questions. The model of reflection provided an avenue for building grassroots involvement in implementing computer technology given the Alberta Province's Year 2000 Technology Plan.

- **To provide a model for professional growth:** The study also contributed to the professional development of teachers from all levels of experience by initiating a process of personal reflection on teaching practice. This reflection provided educators an opportunity to affirm similar or dissimilar experiences with other educators in the field. The exercise also provided direction for questions that related directly to

specific teaching practice. The sense was that this professional reflective practice could be used throughout a career to examine different aspects of teaching, as well as fostering growth among other teachers within the same setting. Richard Butt states, "in their usual role as audience, [teachers] have few opportunities to see the more reflective, knowledgeable side of their colleagues..." (Butt, 1982)

- **To increase knowledge in the field:** The study provided an opportunity for teachers to contribute to the field of education. Teacher language to technology examined a pedagogical sense of using computers in the classroom. Much of the work that has been fostered in the past examined how teachers could be trained to use computers. The research offered a unique focus in that it orientated the teacher toward the planning, purpose, reflection, and questions toward pedagogical questions related to daily practice, rather than focusing on learning what was passed down to teachers by either administrative and, or technical orientated professionals. The purpose of the study allowed teachers to provide insights into the possible uses of computers in the classroom while developing and shaping a methodology that will meet the needs of teachers in the field. The observations of teachers made this research project very valuable for future educators.

- **To Provide a Basis for Personal Professional Growth:** Finally, I undertook in this study to examine my own teaching in the context of using computers in my social studies classrooms. The purpose of the study allowed me to focus on my own teaching practice, and address the questions that I have had in terms of my teaching skills. I believe the interaction with other professionals in the field also provided me with many valuable insights into my own teaching, and through the interaction allowed me to improve areas of teaching practice.

CHAPTER NINE

DESCRIBING THE UNFOLDING OF THE RESEARCH

The following chapter provides an historical overview of the how the research was carried out. The chapter records how an opportunity presented itself to me to expand the research and provide an opportunity for the school I work at to use the opportunity to initiate the development of a technology plan for the school. The chapter discusses the initial discussions with administration, discussions with my university advisor and establishment of a critical friend in the research. The chapter also records how such an expansion in the research affected the methodology that was initiated in the early stages of the research.

* * *

Historical Account of the Research Project

The research was set to begin in September, 1998, at MCS. At this time, I briefly met with the principal to review my goals and go over procedures that would be followed in the research. The principal indicated she was supportive of the research project and gave permission to approach staff members and begin the research.

In the weeks following this initial meeting, I began to pull together a number of teachers interested in the research. I presented each with a research package which included: a summary of the research, a biographical survey, a computer use survey, a narrative/reflective survey, and a journal book to record strategies, observations, questions, and reflections on teaching practice as it related to computer-based technology. I spent time with each teacher to answer questions and then made it a point, to weekly follow up on his or her progress. Meanwhile, I continued to keep a research journal (See Other Sources of Data in Chapter Ten) and followed through with questions, observations and strategies that were part of my own practice. I spent a number of weeks meeting with these teachers after school, and dialoging with them as to the progress of their journals. At this time, I also shared some findings from my journal. The collaborative-style discussions were valuable in providing new ideas for further inquiry.

Preliminary Meeting with Administration

In the latter part of September, 1998, I was approached by my Divisional Leader who was wondering how the research was going. During this discussion, I was asked informally by the Divisional Leader whether I would be interested in heading up a special project in our school that might be beneficial to my research and of great benefit to the school. The special project was to develop and implement a technology plan to address the school's need of developing a technology plan for the school in response to Alberta Education's goal of having all schools in Alberta taking time to develop a technology plan and have in operation by the year 2000.

The technology plan proposed by Alberta Education for each school in Alberta was intended to help schools identify short and long term needs and goals for the implementation of computer-based technology in the school. The province also felt this process would bring about the fiscal responsibility and accountability which was needed if the school was to obtain funding from the government for computer-based technology development. The plan needed to identify and prioritize such things as present technology in the school, present training of staff, present and future plans for carrying out the program of studies as it related to students. Finally, the plan needed to set goals for the future in terms of future considerations for expansion and upgrading of computer-based equipment and resources, and also the future and continual development of programs to train staff members.

This request came at an opportune time as I began to think about the possibility of combining my research interests with the need for developing a technology plan for the school. I felt that the staff would gain by being involved in a collaborative effort of examining their personal work, and it provided an opportunity for the staff to put direct input into the planning of school policy. I also felt that I would be able to contribute to the school and provide a model for encouraging continued participation and professional growth. My initial concern was whether, taking on such a project, I could continue to focus on my research and still pursue the request made by the administrator. At this point, I examined my options and with discussions with the principal, the division leader, and my university program adviser, we came to an understanding that, with the personal consent of the staff, both projects could be joined together. The personal consent of each

staff members involved in the study was needed for the research component of this study because the information would be used outside the school—it was important to all of us that the rights of the staff to privacy be respected. Each survey provided an opportunity for staff members to allow the information they had provided for the survey to either allow the information to be used in this dissertation or to be used only in the context of the technology plan for the school.

Expanding the goals of the research

The development of a technology plan for the school brought me a unique opportunity as it offered an environment in which the research could be used in a very practical manner. The research would serve as a picture of where our teachers were in the development of strategies for using computer-based technology in their classrooms.

Thus, the technology plan project would allow me to facilitate, from the ground up, an opportunity to develop a process to help teachers deal with computer-based technology in a real-time setting. The research would also allow me to address specific areas of research while at the time offer an opportunity to work with a group of my fellow colleagues and make a meaningful contribution to our school. I saw this as a great opportunity to examine research questions in the field using the basis of the knowledge that already had been gleaned from years of practice with other educators as they addressed computer-based technology.

With this in mind, I contacted my university program facilitator. He felt that the following modification in direction would provide a wonderful opportunity for the research to expand and provide a good context to examine the research in a school setting. The research would also have the benefit of moving toward developing a program for educators to with the issues of in implementing computer-based technology and also in terms of initiated reflective practice as a way of developing all areas of growth in teaching practice. Thus examining teacher language toward computer-based technology would be a very practical and useful exercise.

While I realized that the shape of my methodology would have to accommodate a slight shift, this completed work would be an opportunity to see the goals of the research come to fruition. The unique aspect of this work was that it would remain teacher-

centered. The goal from the onset was to allow educators a process to explore their own teaching practice. [As I look back, this project introduced many educators to professional reflective practice which is still taking place throughout our school, and has expanded to all areas of teaching practice This process also introduced teachers to many questions that they face as they examine computer-based technology in the classroom. Thus, the opportunity afforded me was good for those involved in the process. This research opportunity also allowed me freedom to see a work that I found valuable in my own teaching experience expand to other educators and provided me a group of professionals in the field that would contribute to the research in terms of addressing specific surveys and contributing a larger variety of narrative records.]

The opportunity was unique. Our school had never before addressed this specific methodology of gaining information and my research provided a model for us to explore teaching practice as part of our professional growth as teachers. Our search for answers would come from a desire to fulfill an Alberta Education requirement, but also to address how we as a school would move toward developing a program to help teachers examine and collaboratively work toward a improving their practice.

A Meeting With A Critical Friend

I accepted the challenge offered by the administration of MCS. It was agreed from the onset that I would be in charge of the research and that my divisional administrator would play the role of a critical friend for the research. She would also act as a liaison, if needed, with the administration and other interest groups such as the board, parent-groups, and students. (Throughout the study, my divisional leader—critical friend, became an important person who provided support and feedback in helping make this research project a reality.)

At this juncture of the research, I was asked by my Divisional Leader how I perceived we should proceed to accomplish our goal. My first suggestion was that we should both immerse ourselves in literature about producing a technology plan for a school, or school district, and then meet to discuss what we found. It was important to establish an understanding of what had been done in the field so that we could save time by not developing materials that had already been created. My chief concern was to make

sure a framework was established that would allow teachers to shape and have a "voice" in the development of this plan. I did not want a plan handed to them for their approval, but wanted to ensure that the knowledge gained earlier in my research was now enacted to provide the process to allow teachers to engage in a meaningful activity of reflecting, and identifying specific concerns in their practice as it related to computer-based technology. After reviewing the literature, a meeting was held with the Divisional Leader which lasted an entire school day.

The goal of the first meeting was to establish the process of completing a technology plan for the school. At this meeting we agreed that our goal was to set a plan in place to allow teachers an opportunity to guide and direct the work. Basic foundational principles were established to ensure this took place. The research would reflect the following conditions: 1) The research would be constructed as a collaborative effort—this would allow staff to grow together in the process and help teachers more familiar with computer-based technology to equip and help other teachers in the school; 2) The process was also to provide open-ended questions, purposely worded so not to direct teachers into a pre-planned agenda. The sense was to have the teachers shape the plan; 3) Teachers would be invited to participate from the onset and become more involved as the plan moved to completion; and, 4) the plan was to allow teachers and all stakeholders in the school to have avenues of input throughout the process.

The plan was intended, at this first stage, to provide a picture of where we were as a school and to avoid a top down model of what a computer-based technology plan should be. It was agreed that a series of questions be used as a basis to initiate open dialogue, and from the dialogue draw from teacher practice specific concerns that needed to be addressed. We worried, if teachers were handed the model, it might not initiate the concerns that a plan should ask. The sense was the questions should remain open, and from the questions we hoped to examine how we as a school envisioned computer-based technology. Although some assumptions would already be present, they nevertheless combined to provide us where our teachers were in their understanding.

The questions were divided into three scenarios. Three basic concerns and purposes are important to mention here. First, we wanted to know how many of our staff used computer-based technology in their present teaching practice, and we wanted to

know in what capacities the computers were being used. Thus a series of questions (Appendices A-C) provided such a basis. The questions would allow our school to know a number of important administrative and logistic planning questions. For example, what confidence level did the teachers have in terms of using computer-based technology in their teaching practice? Would there be a correlation between confidence and level of use of the computer in the classroom? How did teachers learn about computers: seminars, work shops or other venues for learning about computers? What requirements were there in doing their job that required any computer-based technology training? These questions provided an overall picture of the present state of the staff as they began to initiate computer-based technology in the context of the school.

Second, the teachers were then asked to complete a *Pedagogical Technological Use Survey* (Appendix B) developed to help teachers reflect upon the use of the computer-based technology in context of their planning preparation and implementation of classroom routines. The survey was also intended to encourage teachers to examine their beliefs about computer-based technology and have them consider the implications or concerns that they might have as they examined the role of computer-based technology in their daily practice.

Consequently, the research expanded to provide a picture of an entire school as teachers from all ranges of experiences and concerns collaborated to provide a basis to begin dialogue on the nature and concerns they faced as they examined the role computer-based technology was and would play in their lives.

The third aspect of the study was the *Narrative Writing Research Survey* (Appendix C). In the study, teachers were introduced to reflecting on their teaching practice through the retelling of stories related to their work with computer-based technology. This process was designed to deepen teacher understanding of computer-based technology as it related to daily practice. The narrative writing was designed to help teachers examine their teaching practice in the familiarity of daily practice. They were later encouraged to highlight questions, record ideas, and begin sharing their findings with other teachers in their division as a place to begin dialogue and collaboration to foster growth among the teachers.

It was important to ensure that teachers understood the nature of narrative writing.

(As we would later find out, many teachers had never written in this way, and many saw little use in retelling stories to other educators.) Hence, the survey also provided an understanding of the nature of narrative writing in the context of the research.

The final phase of the narrative components of the surveys concluded with a reflective component. The strategy was to have teachers purposely engage in reflective practice. Many educators in our school found this approach puzzling being unfamiliar with reflective practice. Others in the school had already been introduced to this process in university, or in seminars. Those more familiar with the process found it beneficial and a useful practice to engage in. The reflective components of the narratives had teachers examine their narratives and reflect on why they chose them in the first place. Teachers were to look for the meanings they attributed to the event they recorded in their narratives. On many occasions, teachers openly discussed the context of their stories in which many of their colleagues identified and reminisced with them about details that were either included in the narratives or the reflections or were forgotten by the person contributing the story. This opportunity allowed teachers to reflect even more on the events they had recounted and it provided new insights into their practice that had not been thought of in that context before.

Finally, teachers in the school were asked a series of questions in which the hermeneutic cycle or reflection, observation, and reflection were followed. This aspect provided teachers with the model of inquiry that would be used throughout the research to obtain their input. The idea was to have teachers provide a snap shot of what they presently knew and were involved with in terms of computer-based technology. The final category entitled: *Narrative Post Reflection* was intended to help the future planners examine what teachers presently believed about the role of computer-based technology as it effected, or would affect in the future, students. The purpose was to encourage teachers to move beyond daily concerns of availability of equipment and the scheduling of the computer lab, and to have them consider topics that would expand their understanding outside of the context of their specific classroom to a more global understanding of how computer-based technology effects education generally.

Putting the final elements of research into action in "real-time"

The initial discussions placed the research into a "real-time" frame so that the school could obtain the findings of the research and begin to plan for future purchases of equipment and plan for future training of teaching personnel. It is important to mention that the following sections about the development and findings of this research provide an overview of only some of the findings that were directly related to the initial research focus. Some of the information gathered by me was used by the school for making policy decisions regarding the future purchases of computers, but was not included here because the findings did not directly influence or have any bearing on the initial question about teacher language toward computer-based technology. Items such as the equipment that was purchased, teacher-assistant and office staff surveys, future training courses for teachers, and the school's fiscal resources were not included in this study, though it is understood that each component does shape the direction and implementation of what computer-based technology will mean for the educator in the context of his or her school. My concern remained to record the narratives of teachers as they examined their teaching practice in the context of computer-based technology.

It should be noted that the surveys handed out in this project were also shaped for different stakeholders. Students and parents, administration, office staff, and teacher support staff (teacher assistants and education program specialists) were handed similar copies of the surveys, but directed specifically to their area of responsibility. In other words, the office staff might have different concerns than the principal or teachers in a school system. While the information was valuable to the entire future computer-based technology plan for the school, it was not as valuable for this study.

CHAPTER TEN

THE NEW SHAPE OF DATA

The following chapter provides an overview of the how the expansion of the research as described in chapter nine influenced the collection, organization, and analysis of data. A detailed description of the goals and considerations for teacher input into the research is also provided recorded here. Finally, a description of the school is provided to establish a context in which some of the data was collected.

* * *

Character of the Data

Delimitations and Limitations Revisited

Due to the expansion of the research project the initial goal of having five staff members expanded to include twenty-one respondents to the research. The original staff members I had spoken to were notified of the change in the plans for the research and were asked if they would mind keeping a journal and to participate in the larger school study. It was encouraging to find that all the original participants agreed to take part in the expanded research project. Many of the original staff members responded by contributing valuable information to this research project through maintaining journals and continued to provide valuable insights into this study through their personal interest and discussions with me throughout this study.

The shift in the size of the test group did not change the data in terms of validity. The initial surveys handed to the original test group were almost identical to the surveys that were handed to the larger test group. The major area of change, perhaps, was the number of hermeneutic cycles the research would be able to observe as the original number of five participants would have probably allowed a greater in-depth detailed record of specific teacher's reflective practice over a longer period of time. What might have emerged was a more detailed account of a series of different questions related to the specific practice of these five teachers. In other words, the data would have contained the record of more hermeneutic cycles, though this entirely might not be the

case for it is hard to predict a new emergence of a cycle solely on the basis of more time provided for a study. Some cycles take longer than others; some come quicker than others; so my sense is that the number of cycles probably would not have impacted the study considerably. What was lost is the number of interactions between the original five teachers and a record of specific changes that the original five teachers might have encountered. However, given the direction the research evolved this also did not become a great factor in changing the reliability of the research data.

As mentioned before the original procedure indicated that five teachers would be asked to join in a collaborative study in which the subjects through a four to six month duration would be identifying, evaluating and suggesting improvements for further teaching practice. In the case of the technology plan project, teachers would still be brought together and dialogue would still be encouraged, but this specific area of data would rely more on the surveys and first cycle of reflective practice given through the completion of the narratives and the questions that originated from the reflections on the narratives as given by the participant teachers at MCS. At first I thought the data would not be as in-depth in terms of representing numerous reflective cycles due to the lack of journal writing by the teachers; however, as the research continued I saw that many teachers were keeping journals, as I was and included insights reflected in their responses in the surveys and in discussions with me. Such discussions were recorded in my journal, and with permission from the teacher, were included as another source of data.

To ensure that the collection and organization of data remained manageable the number of questions emerging from the teacher responses were limited to only a few levels of questions. It is not that teachers did not carry on reflective practice after this research—many did, and thus there were more emerging questions not recorded in this research due to time constraints. I also acknowledge the sheer volume of materials required to record the findings of such a large participant number would be impossible unless I took a longer period of time to complete this dissertation, or a number of research assistants were assigned to coordinate the findings. But, given the limited resources for this research, it is recognized here that the limitations imposed are noted

and the findings of the research reflect the initial emergence of questions and reflections as related to the inquiry of teachers at MCS as they engaged in this study.

The basis of the research would begin with responses to specific open-ended questions. The narrative responses and the written journals of teachers would provide a basis for specific interests that teachers were addressing at the time of this study. I recognize that much of the data at this point is a reflection of the beginning cycles of reflective thought. Should the research continue over the next few years the data would be expanded to recognize the growing level of responses that would come from continual reflective practice. The data could hardly be managed at this point unless the research would narrow itself toward one or two individuals. To ensure the research remained accessible and manageable, this change in limitations is here-by noted.

Organization of Data

The majority of teaching staff at the school responded to the series of surveys. It was very encouraging to discover that every teacher who responded to the surveys gave permission for the information to be used in this research project. The greater number of those responding to the surveys also responded to the narrative and reflective components of this research. Overall, the material came in completed and well thought-through thus providing a substantial amount of data for this research project. The material was typed and organized according to the question the data was addressing. The narratives were typed out along with the reflections relating to the narratives. I then read over the narratives and the responses to the questions and if a response was not clear, or remained ambiguous, I approached the teachers who wrote the material and asked them to clarify what they had meant by their response. I recorded the negotiated (clarified) responses as data addressing the concern for reliability of the data in the study. The material was collected and set aside to be organized into themes as part of the foundation of data for this research project.

Other Sources of Data

It should be noted the responses gathered by the teachers from these surveys serve only as one component of the overall data that was collected and included in this research. The narratives and survey responses represent a small portion of the overall data--a tip of the iceberg--that was used. I also gathered data from my extensive journal writings and reflections that took place throughout the duration of my research.

Informal Meetings with Teachers

I met a number of times each week with teachers during the course of the study, and even more often during the final stages of my research to dialogue with them about how they were dealing with computer-based technology in their teaching practices. These conversations spanned many topics and provided me with valuable information in regards to how various teachers were addressing computer-technology in their classes. One area that we discussed a lot was how we were integrating the use of computers into our various subject areas. Some teachers struggled to figure out how they could accommodate this in their practice because of the limited amount of computer resources the school maintained, and also because of the pressure from the province to complete specific components of the program of studies. They found balancing the two expectations was time consuming, and hard to justify in course planning.

Because of my "unofficial" role as a computer facilitator in our school, I was asked questions about setting up computer-based technology in various classroom environments, and often collaborated with staff to address specific questions related to using the computers in daily teaching practice. On many occasions, I asked teachers to allow me to record our discussions and with permission used the opportunity to record specific points and observations as they related to the research. These observations provided me a basis for reflection that is recorded in my research journal

Meetings with Administrative Staff

Another valuable source of data came from numerous meetings with administrative staff. During our time together we often discussed the goals of the school and direction we were taking related to the development of an excellent computer-based technology program. Areas of discussions ranged from developing future plans for the training of the teachers, to also identifying areas in which we could improve the environment of teachers in order for them to use computer-based technology in their daily practice. We also discussed future plans for purchasing computer systems, educational software, and setting up internet access sites in the school. This environment of collaboration with administrative staff afforded me other opportunities to gather data.

Computer Based Technology Seminar on the use of *EClass Grades* for Recording Marks and Generating a Report Card for our Division

I was involved in the initial steps of familiarizing our junior high teachers to use computer-based technology to record student grades for producing a quarterly report card. I was asked to provide input, and to evaluate a number of software packages on the market. Later I was asked to help implement, and to mentor some of the staff in the use of the software package. During this time, I asked permission to use some of the observations I had made, and to record this information into this research dissertation. During this time, I conducted a short seminar on computers for our junior high staff and worked to address questions that arose from the teachers using the system. I asked permission from the staff present at the seminar to record their observations and comments as it related to my research. Many questions arose from this seminar and the collaborative effort in which staff members helped each other to familiarize each other with the computer-based technology was very fruitful. This, one on one, mentoring relationship helped teachers who were not very familiar with computer-based technology to feel more at ease in dealing with questions they had about the system. These observations were recorded in my research journal and were incorporated as a data later in this research.

Seminar on Computer-Based Technology Seminar

Another area of data collection came from a seminar my school asked me to attend. The seminar was conducted by Wayne Blair and was entitled, *Creating Your Educational Technology Plan*. The seminar offered information on creating a computer-based technology plan for a school. The information was valuable, and the discussions that followed provided insights into establishing a model for developing a plan for the school. The information became valuable as a starting point for further inquiry and reflection and was included in my research journal. The information later became important in creating a computer-based technology plan for our school. What my research provided was a methodology to create this plan from the perspective of the teacher.

Seminar on *Kid Picks*

Our school held a one day seminar conducted by two individuals familiar with the program *Kid Picks*. The seminar addressed many important aspects of using the program in the context of teaching practice. I recorded some of my personal observations from the seminar, and also used the seminar to examine some of my teaching practices. The observations were recorded in my research journal and were later used in the narrative section of this research.

Contributing to the Field

During my research, I was engaged in a number of evaluations of software products that were being offered to educators to use in the classroom. My work with software from Statistics Canada, and also with an environmental related software package were both published in educational journals. I also took the opportunity to work in a collaborative effort to identify whether our school should purchase software from a variety of places including: *National Geographic*, *Canadiana*, and *Encarta*. The

of the software for classroom use allowed me to produce a number of reflective pieces in my journal that became important as data for this research.

Thus my data for this research is a compilation of work that has spanned over two years. The narratives and the reflections throughout this research are a representation of a wide assortment of contexts, people, and sources.

Data Organization

The data was first organized in terms of the topics teachers were addressing. The narrative survey responses were placed into four general categories: teacher, student, subject, and milieu. The categories reflect the multiple and interdependent interactions of the teacher, learner, subject-area, and milieu. (Schubert, 1986) Once data was placed into these four general areas, the data was once again organized into specific areas the teachers were addressing. Some areas contained more information as they appeared to be areas of teaching practice that more teachers were addressing at the time of the research project. What emerged from the data was a number of interesting themes that reflected the concerns, reflections and insights of the teachers in the study.

Overall View of Biographical and Computer-Based Technology Findings

General Overview the school

The school in which the research took place is an accredited private Christian School in the west-end of Edmonton. The school follows the Alberta Program of Studies and conducts classes ranging from Kindergarten to Grade Nine. The school has around 385 students enrolled in the present school year. There are thirty-five full-time staff members including twenty-five full- time teachers who presently hold their permanent provincial professional teaching certificates, seven teacher assistants, two full-time office staff personnel and one principal. Three teaching staff members also act as Divisional Administrators.

Students come from all social/economic levels and represent numerous multicultural, and faith, and non-faith traditions. A number of students are designated as

special needs and receive professional intervention for their area of learning difficulty. Many students also are enrolled in accelerated programs that challenge their giftedness.

The Picture of the Computer-Based Resources

At present, the school has one main computer laboratory that consists of twenty-two Macintosh-based computer systems, which vary, in features, model and year. The computer laboratory has one laser printer, two ink-jet printers, and six dot-matrix printers to enable staff and students to make a printed image of their work. The laboratory also has two computers, an upgrade Macintosh based machine, and an IBM based machine for staff use only. The IBM computer is linked on a Local Area Network and is linked to the internet via a direct cable link. Three computers in the laboratory are capable of using CD-ROM's. The laboratory is presently used by grades one to grade nine for the instruction of various aspects of computer-based training.

Two smaller computer laboratories are also being used in the school: the kindergarten has four computers available for student use and a host of software that focuses on counting, reading, and story venues for the children. Another laboratory is found in the junior high language arts room which presently is running five IBM based machines for students to complete final drafts of written projects.

The school also has a computer in the library to keep records of books and resource materials, and also has a separate system connected to the internet that is available for staff and students if supervised by a staff member. The library also has a color inkjet printer for staff use only or, in special cases, for students under the supervision of a staff member.

The teaching staff have all been given one computer per classroom for school administrative work and personal use. The majority of the teachers indicated they used their computers to record grades, class lists, and typed lesson plans as required. A few teachers did not use the computers at all given their lack of knowledge about the machines, or the lack of specific software for their needs. Many teachers also have one or two older computers with math or reading programs, some with games for student use in the classroom.

Division One (Grades 1 - 3) and Division Two (Grades 4 - 6) have available a portable IBM computer that has a large collection of CDROM computer- based learning materials. Teachers must sign this system out so that small groups can use the educational software packages. Students in division one are also assigned specific computer-lab time each week, and are granted use of the Internet-based computer system in the library if supervised by a staff member. At present, division one does not use a specific computer software program to produce report cards.

Division Two has recently employed the use of Microsoft Excel to create an electronic backup for their printout of report cards. The students are also afforded use of the school computer laboratory once or twice a week. Students are also provided to access to the library computer with the same conditions as division one students.

Division Three (Grades 7-9) have computers available to them in the main computer lab, the science classroom, and the language arts classroom. The junior high staff all have an IBM computer available to them and are required to use E-Class Grades to do their grade record keeping on the system. All quarterly and final report cards are printed using this system. (At present, Division Three is the only division who has moved to incorporate a specific required software program to record and complete the compilation of grades over a quarter. It should be noted that other divisions are presently looking at the possibility of incorporating this software into their report card recording.)

The office has two IBM systems presently linked to one computer in the library and to the main computer laboratory. All record keeping, outside correspondence, and other office utilities are done using computers. A hierarchical system has been incorporated on the LAN to ensure security of files in the system. Each teacher has a specific place designated to them to store schoolwork. All teachers also have access to the Internet for collecting resources for their studies. The following has been an overview of the present computer-based technology that was available to staff during the work of this dissertation.

The Picture of MCS from the Pedagogical Technological Survey

The Pedagogical Technology Survey sent to all staff members indicated a number of important facts that provided a picture of the present level of personal and educational

use teachers were engaged in during the time of the study. The setting provided a basis for beginning to implement strategies for addressing specific needs that teachers had as they related to the possible introduction of computer-base technology into their daily practice.

An overview of the initial findings is important at this juncture as it helps set a backdrop to the entire study in terms of the level of present involvement with computer-based technology that teachers had at the time of the study. The overview also established that the majority of teachers were somewhat acquainted with computer-based technology and therefore the questions being raised by the teachers in the process provided by their involvement in the research suggested a general starting place for inquiry into the core of the research. The following is the overview of this process.

Summary of the Development of the Question

When developing the question the critical friend and I wanted to ascertain the number of teachers presently using computers in the school. Our first draft was worded: How do you use computers at the school? While the initial wording was similar, the question suggested that there was an expectation that a teacher should be using the computer or that the question only pertained to teachers who used computers in the school. Our initial goal was to leave the question open so that as many teachers as possible could respond. The question was structured to be ambiguous in that it did not isolate computer use into a specific area of practice. The question was constructed to allow teachers to respond to the many uses that computers may have in teaching or private practice. By not narrowing the question we felt that teachers would illuminate areas we might not have recognized or missed because of the initial construction of the question. Thus a question like, how do you use the computer in teaching your students' would have been too narrow. Many indirect uses of computer-based technology would have eluded my picture of the uses of computer-based technology as experienced by the teachers in the study.

Do you use computers at school? If so in what ways? Please explain.

Overview of Teacher Responses

Generally, the respondents indicated a wide range of computer uses. The majority of teachers used computer-based technology in three specific areas: administrative work, preparation of lessons and materials, and computer-based instruction for students.

Teaching Administrative

Teachers indicated that they used computers to calculate marks, record comments and create forms for office correspondence. Other uses included using computer-based technology for scheduling and long-range planning, for creating materials for special events, letters to parents, daily lesson planning, unit planning, and yearly course planning.

Daily Teaching Responsibilities

Teachers noted that they used computers to create tests, worksheets, notes, and other written resources for their students. Teachers also used computers to gather information for classes from the Internet and from other sources—CD-ROM's. Teachers also prepared programs to help students with specific instruction such as math lessons and projects, science and social studies projects, and writing projects related to language arts. Teachers used computers as a source for further materials for specialized student projects like research papers or specific course presentations. Students were given opportunities to use CDROM and Internet-based resource materials. Other uses of the computer-based technology were keyboarding practice and general familiarity with the computer-based technology equipment and its various applications.

Other Uses of Computer-Based Technology

Teachers indicated that they used computer-based technology to email friends and family, and to correspond with other schools in preparing and planning events. Those responding to the survey indicated a wide range of uses for the computer.

It was interesting to discover how many teachers used computers in their daily planning, but later would state that they were not fully confident to introduce computers into their own classrooms as a major component of student instruction.

Have you had any training in the use of computers in the classroom? What training have you received? Do you feel the training was adequate? Why or why not? Explain. (Include university courses if applicable.)

Summary of the Development of the Question

The second important question in ascertaining the level in which teachers were engaging in computer-based technology was to find out the extent of training teachers had before entering the field of teaching, or had obtained after they had entered the field. Not only were we, my critical friend and I attempting to find an overall level of training, we also wanted to know the confidence level teachers expressed after they had taken the training. These questions would provide an understanding of what teachers knew about their own training, and whether there was a correlation between having a reluctance to use computer-based technology because of feeling inadequately prepared for the task.

Overview of Teacher Responses

The majority of teachers indicated that they had at least one course in their university training. As one teacher stated, " My training has not been adequate. The full extent of my formal training has included one University course (introductory) and one workshop at MCS on Kid Pix." This was the consensus of the teachers who responded to this question. While each had taken a mandatory course in computers, the training had been very basic. Furthermore, the training had not specifically been focused on how to engage students to learn using the computer as a vehicle to present subject-specific materials, nor had the training focused on how to identify, and initiate specific identifiable strategies that would meet specific curriculum guidelines as they related to the program of studies. One teacher stated, "I have received basic computer training at the university level, but nothing on how to teach using computers. The training was sufficient but I found experience (practice) to be the best teacher." This statement was supported by a first year teacher who has just come out of the university environment.

She concluded, "[I took my course at the]university—intro to computers—it helped [me] to understand computers, but was [the course was]not specific to teaching... I wish I had been exposed to more software for the classroom."

The concern many teachers expressed was that what they learned was not transferable to the environment they now worked in. One teacher stated, "[I took a course to complete] my B Ed. degree is in teaching business options including computers and word processing. [The] university training stunk. It was frustrating and of little value as it concentrated on particular software mechanics and not practical skills that could be transferred regardless of software. One respondent did point out the value of collaboration as she remarked that her training had come from being on the job, and also from friends. She also stated that her training was no longer applicable because she felt it was outdated.

Overall Summary of the Background of Teachers in the Context of Study

Interestingly, while most teachers used computer-based technology in their practice, they had not received formal training in applying this technology to the present classroom. This was reflected not only in teachers who had completed university years ago, before computer-based technology was even an issue, but this same response was indicated by teachers who had completed university only two-three years ago and had entered the teaching profession. It should also be observed that teachers appear more confident about using computer-based technology in the planning and administrative components of their work, but less confident using computer-based technology directly in connection to delivery or instruction in the classroom. These two questions initiated an examination of the teaching staff and the present level of use of computer-based technology in the school.

CHAPTER ELEVEN

OVERVIEW OF THE NARRATIVES

The following chapter provides an overview of the narratives gathered throughout the study. The chapter also provides an overview of how each narrative was given a title which reflected the major theme as expressed in the narrative. The chapter also identifies how questions were extracted from the narrative followed by teachers reflecting upon the initial questions and themes that arose from the retelling of their stories. The chapter provides a basis for understanding how Chapters Twelve to Fourteen were organized.

* * *

The following narratives are the compilation of teachers' stories that address the teacher language to computer-based technology. The stories are a small representation of numerous narratives that were given throughout the progress of this research. The stories that were used in the following sections encompass a wide range of experiences and understandings associated with the nature of pedagogical praxis. The stories are personal, unique, and in the language of the teachers that experienced or reflected upon the event. Each story promotes further thinking and reflection upon teaching practice, for each story is a starting place of inquiry, where teaching practice is explored in relation to the beliefs and goals of the teachers who participated in this research.

The narratives in the following section were organized into the four general categories modeled by Schubert's four common places of curriculum as discussed earlier in this dissertation. The four common places of interactions: teacher, student, resources, and milieu established a place to begin to organize the narratives. From these four common places of interaction, narratives were organized into specific subject themes according to what emerged from the teachers' practices. Some areas of teacher practice discussed by teachers in the study received more attention from a greater group of teachers than others. This provided an opportunity to recognize and explore a variety of questions that were more commonly identified as issues that teachers were dealing with related to their teaching practice.

The narratives reflect a starting point and model the basis for a continual process of reflective practice. The basis for this reflective practice begins as the teachers and I engaged ourselves in a common area of focus exploring the notion of teacher language

toward Computer-Based Technology. Each narrative is intended to spawn new ideas and insights: the reflective practice that will draw from these insights will go on well after the completion of this dissertation.

NARRATIVE TITLE

Each narrative has been given a title that represents a major theme that emerged from the narrative. The narratives have come from discourse which, as Gadamer states, opens the path to the question or the process of inquiry and establishes "the path of all knowledge...."

> Discourse that is intended to reveal something requires that things be broken open by the question. The path of all knowledge leads through the question. To ask a question means to bring it into the open. The openness of what is in question consists in the fact that the answer is not settled. (Gadamer, 1989, p. 363.)

As a theme emerged from the question found in each narrative, there was a sense that the story continued to the present and into the future. Thus, each narrative records the thoughts and reflections of the teacher who retells the story, and establishes a place for further inquiry. The story is not the end of the process, but a place for beginning further reflective practice.

REFLECTIVE QUESTION

Before each narrative, a question is provided that directs the reflection toward the theme of the narrative. The question represents a starting place of inquiry for the narrative, or a question that emerged from the narrative and/or reflections provided in response to the narrative. The question is intended to remain open and provide a basis for further reflection and inquiry.

TEACHER REFLECTIONS

The following narratives will be given in the teacher's own words and relate a story and/or a reflection about a specific incident that stands out in the teacher's mind. The story will address specific areas of teaching practice that are important to the teacher.

The narrative style is simply the "retelling" of an event as the teacher would normally recount it in his or her own words. From this narrative insights and further themes will emerge to highlight specific areas that teachers were thinking of when they were asked to relate stories connected to their experience of interacting with computer-based technology in their daily teaching practice. Some narratives show successes: others show struggles as teachers moved toward understanding and developing strategies to implement computer-based technology into their teaching practice. The narratives provide a starting place for identifying specific practices and then formulating strategies for improving teacher practice. Through the process of reflection, the narratives give readers the present experience of teachers at MCS as they move toward computer-based technology as a way to begin discussion about their teaching practice.

Teacher reflections center on various topics that emerged from the narrative the teacher chose. The reflections provide a time in which the teacher examines specific issues and contain, at times, strategies for action. Depending on what the teacher has identified in his or her practice will determine the nature of the reflection. Often a reflective piece provides a starting point for further insights that come from previous experiences, collaborative discussions, or other sources such as readings from the field. In each case, the reflections provide another source of teacher language toward computer-based technology as they provide a place to engage the lived-experience of the teacher.

FURTHER REFLECTIONS

Further reflections are comments made in response to teacher narratives and teacher reflections. The source of further reflections come from my own reflective journal, and also from the reflective responses teachers provided on the computer-based technology surveys. Other sources include the written record taken from personal dialogues with other teachers and from the teacher's own reflective response journals. The reflections attempt to raise a number of questions that emerge from the texts. An attempt is also being made to see all the narratives and reflective pieces as a larger picture of the present teaching environment of MCS. This picture is provided so that the narratives have a sense of the school context in which they originated. Therefore, the narratives and the subsequent organization of narratives into themes and chapter divisions

should not be interpreted in isolation from each other, but the themes must be understood to be interdependent.

The narratives and reflections are to be a picture of teachers in practice; such practice is not isolated from any contact or is not chronological in the sense each theme has no bearing on the other themes. In actuality, the emerging themes and chapter divisions reflect the interdependence that exists between teachers and those they daily interact with in the context of the school. The reflections attempt to provide a picture of the numerous voices of teachers who engaged in this collaborative study of inquiry to provide a basis for further reflective practice into topic of questions that teachers would have as they examined computer-based technology in the context of their daily teaching practices. Further Reflections joins these responses so that the narratives are not merely examined in isolation from each other, which would not reflect the present reality of a normal day at MCS.

CHAPTER TWELVE

THE STUDENT BEFORE THE TEACHER

In the following chapter, the narratives are organized into various sections which focus on two important aspects of teaching: student/teacher relationships and developing strategies for evaluating students by teachers in the context of computer-based technology. The entire series of narratives focus on the teacher's view of the student before them.

In the first group of narratives, the teachers reflect on the value of building good relationships with students. The teachers use various strategies to engage the student in learning and take great efforts to observe how students are able to carry through with the activities they were given. The teacher's success is rewarded when a student accomplishes the task before them, and enjoys a measure of success. This special relationship is important to teachers as reflected in the narratives.

When a student struggles because of an activity that fails to direct the student toward the intended learning objective of the teacher, the teacher experiences failure also. Teachers openly address their struggle when they are faced with trying to build confidence in their students, especially when the teacher finds that his or her strategy to engage the student falls short, or the expectations are set beyond what the student is capable of producing at the time of the lesson. Many teachers suggested in their narratives that there is a struggle to set parameters of expectations for students especially with computer-based technology outcomes. The newness of this environment challenges teachers to reexamine this area of understanding goals for their students. I also noted teachers want students to move beyond their discomfort of the computer-based system, which is in itself ironic. It almost suggests, "Do as I say, but don't feel like I feel about these computers."

The second series of narratives examines another important area of teaching. The narratives examine the nature of evaluating students. A number of issues are addressed in this series including an examination of using computer-based technology to organize the collection of data that will determine the grade level of students. In this context, teachers look at how they presently use computer-based technology to organize administrative duties that are related to evaluations of students. The narratives also reflect how computer-based technology shapes the way teachers evaluate students.

Another narrative deals with the struggle to understand computer-based technology skill outcomes and the ability to recognize when a skill is mastered by the student. The next narrative deals with the fairness of evaluation in comparing assignments that have been produced by students using two different technologies. The first students use computer-based technology to produce the final draft of the assignment, while the other students use their artistic ability and good penmanship to accomplish the same task. The teacher in this case reflects on the ability to create criteria for grading the assignment in an equitable fashion. Other issues that are addressed include the topic of plagiarism and copying of work using computers, and the need in redefining a criteria for computer-based technology based assignments. The narratives in both series examines

the teacher/student relationship and the effect computer-based technology has in shaping the relationship of the learner and the teacher.

* * *

THE INTERDEPENDENCE OF STUDENT AND TEACHER SUCCESS

How does computer-based technology shape our view of success?

Teacher Narrative

I try, when I can, to relate what we are learning in math to some applicable tool on the computer. I experience "success" when students are able to solve some of their own problems or answer some of their own questions. Also, when they are able to feel comfortable to move around the computer and not scared to try new functions and operations. I hope that some projects that I have done this year have enabled the students to increase their comfort level with the Hardware and Software.

Watching a student lose all their work because of a disk error or a computer freezing-has been frustrating. Sometimes it seems that students do not retain the "how to do something." My expectations of them may be a bit large. We have come a long way-but there still is a long way to go.

Further Reflection

In the first narrative, a math teacher examines the topic of what it means to a teacher to be successful. Teacher success is often tied to student success, and failure especially frustrates teachers especially when the teacher does not have control of the environment. Addressing the topic of success, the teacher sees success for her students in terms of computer-based technology as a measure of independence and confidence in using the computer-based-system. The teacher states, "I [as a teacher] experience "success" when students are able to solve some of their own problems or answer some of their own questions. Also, when they are able to feel comfortable to move around the computer and are not scared to try new functions and operations."

In this narrative, the teacher's desire to have her students experience success is juxtaposed against what she identifies as one of her greatest frustrations which is experienced in "watching a student lose his or her work because of a disk error or a computer freezing". The teacher relies on the assumption that a student's hard work should be preserved without fear of being lost due to an unpredictable and often unreliable technology source. In some ways, it is one thing for a student to lose his or her work on their way to school—my dog ate it scenario, but all teachers have experienced the frustration that comes when the teacher feels responsible for the loss of a student's work.

Other areas of concerns she identifies is how students struggle to retain the "how to do something" that is part of computer-based technology. The teacher is relating to the various steps it takes to carry something out in a application software. Many students struggle to remember the steps they must take, given new software applications, to accomplish even the simplest changes. Computer-based technology demands a common knowledge and the flexibility and ingenuity to apply certain routine steps in another software setting, and have the confidence of returning to a specific place in the software when changes do not go as planned, and another series of steps and strategies are needed to meet the required goal of the student. Finally, the teacher ends her reflections pointing to how success is associated with the teacher's own expectations of the student. The teacher states, "Sometimes it seems that students do not retain the "how to do something." My expectations of them may be a bit large. We have come a long way, but there still is a long way to go." The concluding comments made by the teacher are quite interesting. The question relates to what a teacher sees as valuable for his or her students to know about interacting with computer-based technology. While one teacher might focus on keyboarding skills, another teacher will look at sequential processing skills as this teacher has done. Each teacher will have areas of expectations that they believe are important for their students in relation to computer-based technology. Examining these expectations is an important topic to review.

Student Expectations: The Student Learning Before Us

Does computer-based technology shift our expectations of the learner before us?

When teachers were asked the question in the survey, "When it comes to technology, what do you feel you want your students to know and accomplish?" they responded in many different ways. In terms of expectations, teachers felt they had a "larger" picture of the implications of computer-based technology than they saw their students exhibiting. That is, many teachers felt the children knew more than they do in being familiar with their way around the computer, but were limited in the scope of what computer-based technology could bring to their education.

Teacher Narrative/Reflections

DE My primary purpose is to make them familiar and comfortable with computers. I also want them to know that they can look at computers as tools to help them in every day life.

LB It is important for staff to be involved and comfortable with technology. We need to provide what is necessary for that to occur. Students need to learn pros and cons of technology, and be equipped for High School and eventually the workforce. In all this, I believe it is imperative to be wise and cautious and discerning in how we go about integrating technology.

TD I want them to see the computers as tool for helping them in day to day activities and to feel comfortable using the computer for such activities. I want them to see the computer as something that is not only "fun" but also a tool for them to use academically.

NH I want my students to see technology as a means of expressing their ideas in a new way. I would like them to feel comfortable and able to use technology at a young age, is they do not experience the fear or apathy I feel.

MR I want them to know that technology is a tool to help with their studies, but that it will not replace their need to involve themselves in their own learning. E.g. Not just "pulling" info from the internet.

BP To be able to use the programs that we have to reinforce readiness and early reading and math skills.

MK I would like them to have a base knowledge of technology-what is out there and how to use it as a tool to gain more information or produce a document.

VS Most students are familiar with some aspects of technology. Many have access to the Internet, but I think they have limited knowledge of how to use it as a learning resource.

Teacher Reflections

TD responds to the initial question, what is your expectation of a student in terms of computer-based technology? by stating, "I want them [students] to see the computers as a tool for helping them in day to day activities and to feel comfortable using the computer for such activities. I want them to see the computer as something not only "fun" but also a tool for them to use academically. TD points out an important aspect that is also conveyed by VS. VS states, "Most students are familiar with some aspects of technology. Many have access to the Internet, but I think they have limited knowledge of how to use it as a learning resource."

MR supports this position when she says, "I want them to know that technology is a tool to help with their studies, but that it will not replace their need to involve themselves in their own learning. E.g. Not just 'pulling' info from the Internet." MR points out that computer-based technology still demands the process of learning: there is a sense that computer-based technology makes the organization and acquisition of information more manageable; however, as MR points out, computer-based technology still requires specific skills that keep the student responsible for their learning. A

tendency is that computers will alienate the student from their learning environment. MR suggests a need to help students use the technology as a tool, but not expect that the "technology" will replace their involvement as students in learning.

Interestingly many teachers suggested that one aspect of computer-based technology was to inform students of the importance of examining how the technology they were using both as an instrument—a tool, and also in terms of examining the technology would affect their lives. LB brings this important view of the learner when she points out the importance of both staff and student understanding the implications of computer-based technology on society.

> ...it is important for staff to be involved and comfortable with technology. We need to provide what is necessary for that to occur. Students need to learn pros and cons of technology, and be equipped for High School and eventually the workforce. In all this, I believe it is imperative to be wise and cautious and discerning in how we go about integrating technology. LB

NH wants to build her student's confidence using the technology before them. She sees the potential available for her young students and how that compares to her present state of being unsure with the technology. NH states, "I want my students to see technology as a means of expressing their ideas in a new way. I would like them to feel comfortable and able to use technology at a young age is they do not experience the fear or apathy I feel. The learner, for NH, is independent and not hindered by preconceived notions about the computer. The learner is able to move beyond the experience of the teacher. NH feels that learners must be introduced to computer-based technology at an early age so that they can approach the technology without the reservations that the present generation of teachers is experiencing.

DE encourages this same environment for students, "They [students] should feel comfortable working on a computer. They should be able to open programs, close programs, generate and save files, and be able to sequentially solve problems with their computer." NH and DE both bring up an important aspect about being comfortable with computer-based technology and not being intimidated by the newness of the technology.

The sense is that this keeps the user of the technology as a distant observer. The learner must be equipped to function with confidence in an environment that promotes experimentation and creativity.

Further Reflections

Finally, teachers expressed the sense that learners need to have a basic level of knowledge to engage in computer-based learning. Interestingly a lot of teachers would not probably say this about the overhead projector, or the use of the chalkboard in a classroom setting, but in the case of computer-based technology, the teachers felt the technology would have a greater impact in the learner's present and future environment and thus the technology must be studied as a "technology." MK states this in his reflections, "I would like them [students] to have a base knowledge of technology—of what is out there and how to use it as a tool to gain more information or produce a document. BP supports this point as she remarks, "To be able to use the programs that we have to reinforce readiness and early reading and math skills."

From these responses a number of key points emerged in understanding the notion of the learner: 1) the learner must understand not only how to use computer-based technology, but also understand the personal and social implications of using this technology; 2) the learner must be encouraged to see computer-based technology as an instrument to access resource materials, but must continue to develop a sense of ownership and responsibility for learning outcomes; 3) the learner must be afforded opportunities to study the pros and cons of computer-based technology; 4) the learner must be helped to move beyond the fear or intimidation that is presented by being unfamiliar with computer-based technology and be given earlier intervention to gain a confidence in using the technology; and, finally, 5) the learner must be afforded opportunities to develop specific skills so that computer-based technology will enhance his or her learning experience.

SHAPING A WAY FOR STUDENT EVALUATIONS

Shaping Evaluation in a Computer-Based Technology Environment

The findings from the computer-based technology surveys revealed that many of the teaching staff at MCS were using computer-based technology to calculate and organize final grades for evaluative purposes. As evaluation is such a big part of a teacher's experience, it is not surprising that teachers would address this issue during the course of this study.

Teachers Using Computer-Based Technology Make Evaluation Easier

How does the technology shape our strategy for grading and evaluating students?

Teacher Narrative

I have experienced success this past year in using technology to aid me as a teacher. Every term that report cards would come around I would feel overwhelmed at the amount of "number crunching" that would need to be done. I think that this duty in preparing report cards would frustrate me because of my knowledge that there must be easier ways to calculate scores, rather than just by calculator and pencil. So I did some research. I went onto the Internet and looked into marking programs and I also explored a marking program for computers that our school had purchased. I was not happy with any of the programs I researched because they were just to complicated to use and did not do what I wanted them to. So, I decided to use my knowledge of excel to create my own program. I created a program that looked identical to my mark book where I could enter individual assignment marks. Then using formulas I told the computer to total marks for each term on an on-going basis and then calculate the percentages for me based on these totals. This program, that I developed at home, has cut my report card time in half. TD

The teacher provides a wonderful success story for the teacher using computer-based technology and integrating the technology into daily practice. As mentioned before the majority of teachers at MCS use computer-based technology to calculate grades, and to produce the a final printout for a record of student achievement which is valuable during teacher/parent interviews and also identifying areas of strengths and weakness in a student's progress, or in the progress of an entire class. Computer-based technology helps to correlate materials together that normally would not have been able to be done due to time and the sheer complexity of the work. One teacher alludes to the use of the computer in this function by using the term, "number crunching."

While one teacher had success acquiring the knowledge she needed another teacher, hearing of the possibilities of using computer-based technology in organizing her final summative evaluations attempted to immerse herself into the technology, but soon struggled and failed to meet her initial goal. She found the process extremely frustrating and burdensome.

Preparation and Planning

Does Computer-Based Technology Poise Any Problems for The Novice?

Teacher Narrative

> On our first PD day, we were [given the freedom]to work on anything. I decided I would attack *eClass Grades*, a report card software program, and set myself up for the year. Well as "easy" as the manual was supposed to be, I ended up spending time crying, as I could not figure it out at all! Not a success story that is for sure. Another frustration was I did not know whom to turn to for help. Teachers always are busy and it is hard to ask for help with something that will take a lot of time. MN

Further Reflection

The narrative demonstrates that, in some cases, a gap can exist between wanting to engage in using computer-based technology, and actually receiving the knowledge needed to ensure that the teacher is equipped to use computer-based technology. As

Baker states, in relation to computer-mediated instruction materials, bringing the teacher to the technology requires some formal steps to ensure a higher success ratio.

> The basic idea behind the creation of Academic Systems was to bring together under one roof: i) the enabling technologies necessary to develop instructionally effective CMI materials; ii) the organizational infrastructure, procedures and disciplined behaviors necessary to develop these CMI materials on a regular, predictable schedule; and iii) the sensibilities, expertise and commitment to collaboration necessary to make these CMI materials attractive and useful to instructors and their students and the acumen to achieve these complex objectives while building an organization capable of making effective use of its limited supply of equity capital. (Baker, et el. 1997 p.3)

Many assume that what is easy for one person will also be easy for another teacher to use. The teacher in the narrative was frustrated with the software instructions given by the company that created the program. Although someone had told her the software instructions were easy to follow, she did not experience such ease. The teacher not only hid her frustration but also refused to pass the problem to another teacher. Her choice of action is not surprising. Many teachers feel isolated in their work, and they assume that other teachers are too polite to indicate that they are too busy to help them, so often they simply do not seek the help they need.

The teacher's dilemma tells us that computer-based technology knowledge is better passed on and gained through smaller groups established to help one another. In the early stages of learning about computer-based technology, administrators must take this consideration into account, especially if teachers are going to find a way to familiarize themselves to the many facets of computer-based technology. This is supported by the work of Steve Cameron who addressed the impact of such a change to teachers by alluding to Daniel Cheever's work *Administrator's Guide to Computers in Education* (1986). Cameron believes the teachers are faced with a demanding task and that computer-based technology poses "a radical departure from current educational practices...."

> Educational computers can be "very demanding of teachers, requiring retraining, changes in pedagogical practices, and an entirely new body of knowledge to master. The most exciting uses of computers in education

> are a radical departure from current educational practices and could be threatening to educators and parents alike" (Cameron, Cheever, p. 273).

Cameron's position supports the importance of providing teachers with appropriate times and resources to address their needs. Cameron also suggests the use of seminars, workshops, and tutorials as vehicles for supporting teachers in using computer-based systems in their daily practice. The key to success for teachers is providing a support system for them where teachers feel free to ask the questions they want to know.

> For this reason, the appropriate time and resources must be allotted to promote understanding of the technology to the educators themselves, through seminars, workshops, and tutorials. One of the tasks included in promoting understanding of the available technology is to make teachers aware of the programs currently available that aid learning. There is an ever-widening selection of software that can be used to supplement the teaching of subjects such as reading, math, science, history, and so on. Even so, courseware remains an issue. Despite this explosion of educational applications, software that can address the needs of particular curricula is still not always available. (Cameron, Goodlad et al, p. 20, 1994)

There is no doubt the teacher felt isolated in her experience, and because of this isolation, she was unable to find the answers to her questions that she needed. Computer-based technology requires a collaborative effort where questions regarding the use of the technology can be examined, specifically, and the premium resource of time is used efficiently.

Student Evaluations: The Aspect of Fairness

Does computer-based technology create an unfair advantage to students with or without the resources of CBT?

During the discussions that surrounded evaluation, one teacher began to think about the Province of Alberta's move to allow students to use computer-based technology in writing their grade nine provincial language arts exam. The teacher indicates he has graded provincial papers for a number of years, and remembered seeing more students use computer-based technology to complete their work than ever before

during the last year of grading. He stated that he is not against the use of computers, but wondered if the "playing field" for the student was still level. His narrative and reflections examine the question of the effect of equality of resources in education in terms of students' achievements.

Teacher Narrative/Reflection

Evaluation of computer-based assignments has posed an interesting query. Do students who are afforded the use of computers during the provincial examination, have an unfair advantage in terms of the correction of spelling and/ or grammar? They might also inherit an advantage in drafts as computers allow for numerous changes versus, other ways of writing—yes, including gallons, or liters of white-out. There are a number of questions I raise here as an educator.

I have been instructing language arts grade nine students for the last eight years. As of late, students have been provided opportunities, as I understand it, to produce their final drafts using computer-based technology. The written component of the provincial exam is allotted two hours, with ½ hour added on if a student needs this time. Over the years a student is no longer responsible to produce a final clean draft, or produce an outline as a requirement of the examination. Because of this many students who write by hand find themselves committed to presenting a draft that they normally would have taken home and edited carefully to complete a final draft. Many of these students would have used computer software packages to do this. With a computer large amounts of editing requires a minimum amount of effort versus doing the editing by hand.

Some teachers would suggest that all a student needs to do is draw arrows to indicate big changes; however, being a provincial grader, I know that when I have been given two or three arrows to follow it breaks the flow of the reading, thus what might appeared to be fragmented, may well be that

the reader has had to follow and jump from one place in the document to the other. I believe computer-based technology gives some students an unfair advantage in some cases.

The problem could be easily rectified by having all students use a computer-based technology to complete the final draft, but then this still does not cover the entire problem. I point out the different software packages that would advantage some students, while disadvantaging others. For example, there is a marked difference between using a program like *Claris Works 4.0* which has less features in terms of automated grammatical and spelling checkers versus a program like *Microsoft Word 7.0.* In my opinion, the province needs to look into this to find an equitable system.

Further Reflection

In the teacher's experience, computer-based technology influences and challenges him to find equitable ways of examining his students' work. The narrative/reflective piece draws us to an important question and observation. Does the ability to edit and format written work easier, using computer-based technology, provide an unfair advantage to some students? (It would be interesting to record how students who used computer-based technology versus those who did not faired on the provincial examination. It would also be interesting if a study were done on the provincial markers in which grades assigned by provincial markers were compared in terms of those drafted with computers versus those that were written or printed freehand. If computer-generated materials, generally, received higher grades than other materials handed in then we would be able to suggest that computer generated materials do advantage one group of students over another. It would be advantageous to examine studies from the past; however, computer-based technology has no comparison from the past, because no other technology has created such a gap in terms of providing advantageous resources for the writer, not merely in terms of having writing resource materials to support the

writer, but the ability to speed up the process of editing, and even the ability to suggest editing changes that enhance the level of the final product.)

Tuman in his book, *Word Perfect*, suggests similar questions were asked by educators when the technology of the slate board gave way to the newer technology of the pen and the paper. (Tuman, 1992, p 31) Would such technology provide an advantage, or disadvantage to present and future students? Teachers were on both sides of the issue, some feeling that the new technology would not embrace the foundations of what had been centuries of established practice. The same issue presses the teacher in this narrative to address fairness and equity in his own practice. The aspect of dealing with fairness in evaluations so that all students are on a level playing field, and the aspect of how such a technology will shape the way we edit or writing: a computer-based technology favoring students by providing an unfair advantage in editing their own work; as compared to editing by conventional methods are both important issues to address. No final solution to the problem is addressed in the narrative/reflections, but the narrative does provide a starting place to examine a very important issue: the aspect of fairness.

Evaluating Context, Quality and Consistency

Does Computer-Based Technology Redefine the Requirements of an Assignment?

The following narrative brings up another important story of student evaluation. Like most teachers we examine the goals of a specific project and then provide our students with a standard and requirement for the project. Students want to know such things as, will this count for grades? How long does my response to the assignment have to be? Does the assignment have to be typed? Will I receive more marks if I take the time and effort to type my work? Can I use my computer to make a cover page? When is the assignment due? It is amazing how these questions become part of the culture that exists in schools. The following narrative explores the nature of these questions and how computer-based technology influences such basic questions.

Teacher Narrative/Reflection

In one of my classes, I was giving instructions about the guidelines that I wanted followed for the completion of an assignment. I went through the usual standard, the topic, the length of the paper, draft quality, organization, a theme statement etc. After going over this list thoroughly, I had one student put up his hand. He asked, "Can we use a computer to type out the assignment?" Yes, I informed him, this would be okay. Up went his hand again, "Is there a style of font or size of font you require?" No, I stated, it did not matter...It was then that I noticed the student asking the questions and a close friend of his smile at each other. Now, I knew they were up to something so I inquired why the smiles. The one student, the friend of the one asking the questions replied, "Like you said, we can use any size font?" Immediately, the warning bells went off. "No," I stated, "You must use the default size of font which is..." I was interrupted, but what if we have a Macintosh computer and the font size is different? At that point, for the sake of getting the class moving, I told them they were to start on the rough draft of the assignment today, and tomorrow I would come with the requirements of the assignment as shaped by the use of a computer for producing the work. I had entered the computer age even if I did not want to at this time!

Teacher Reflection

One of the most common questions I face in my teaching practice from students is how long must my assignment be to receive passing grades. Over the years I have attempted to accommodate this question by establishing what I feel is good standardized guidelines.

I remember years ago teachers stating that an essay, to use an example, should be 500 words. Now for the average student this will work to provide a guideline for what is expected. In most cases, the student is trying to figure out whether the assignment is a minor, or a major assignment. Thus the teacher who asks for 500 words for everyday-

type-assignments will receive a minor-type-assignment from the average student. Keep in mind that students who struggle with written language skills will find this a challenge, and students who excel in language written skills will find this a fifteen minute project. Such a student will complete the project in a few minutes, and then be asking if he or she can get on to his or her math homework, or daydream about basketball given his or her particular area of interest.

The teacher who then gives the occasional 750 word assignment, and then the ultimate 1000 word assignment, will find that it is not the word count that actually matters. Somehow, the effort and level of care are established in what students see as a relative comparison. So it does not matter whether you assign the pages one page minimum, two page average assignment, five page major assignment, or ten pages the "killer assignment" Generally, the same conditions apply. The amount of work, quality, and consistency is somehow understood by the teacher as a starting point for a student at a specific grade level of complete a specific project. The teacher attempts to make the assignment challenging enough and inviting enough for students to do their best. The assignment should delineate between weaker and stronger students in terms of writing, or subject matter strengths and weaknesses. It is interesting to listen to students who actually count the hand-written amount. " I only have 467 words, "Is this enough, Mre?" or "Mre, I write smaller than everyone else, do I have to write three pages, too? Could I write 2 ½ pages?"

I thought that I could handle this in the computer age, but I was wrong. I thought over the scenario. Do you unintentionally discriminate against the small writer and wield great advantages to the "mega-stream" writer— you know the type of student who thinks that every letter is a flowing adventure in itself? Or do I find a happy medium that will provide a more equitable system of handwriting evaluation? I thought that I had dealt with the obvious when now I am faced with an even greater challenge, the challenge brought to me by the computer age. Now my students ask, Mre what style of font should I use? What size of font should I use? If I type out my three pages of writing how many pages will this be? Do you mean three pages—typed? Or do you mean three pages, written, or printed, and then typed?

The greatest task I face as a teacher today is being a translator of text. After all, the 12 font Times New Roman cannot be found in any other format because the font names and style are copyrighted by the software companies that produced them—obviously so that we cannot hope to gain uniformity, and why would I look for uniformity because after all did I expect uniformity when everything was hand-written—NO!

Thus my challenge today was before me. The student with the fancy word processor finds that he has 500 words exactly and stops. Now the short story is even shorter, and the story ends somewhere in the introduction. I can see such a student after every four or five words, including such favorite words as "a", "as", "is", "The" jumping for joy when he or she discovered they are at 498 words and only need two more little words, like "the end" Or for the student that is guided by trying to drive me up a wall when they state, "Mr.e, are we allowed to double-space? Or are we also allowed to use 15 font size with 3D looking shadow on the sides, or move in our borders by 1.2 inches instead of the 1 inch standard, if we are short of three pages you required?"

How do I know they will use these guidelines? Well, because I have used them, myself in ages past, when the professor I had at university failed to understand the complexity and shape our computer world would bring to simple things like assignment guidelines. I remember him stating with a note of control and power, "Your assignment shall not exceed ten pages single-spaced. Anything that exceeds this, I will not read." Wow! So I found myself widening borders creating a 9.5 size font, shrinking headers and footers, and even creating a new spacing size called 6.7. Now my fourteen page oversize monster of a paper fit perfectly into ten pages. Got-ch-ya Professor!

Teacher Further Reflection

Somehow I feel like the teacher of yesteryear who probably received a flurry of hands asking, "if I use paper (voice of some affluent learner) can I only do one page instead of the required two full pages of slate work? After all, my mother states that paper doesn't grow on trees you know!" I guess educators will never avoid the struggles that come with change. Unfortunately, I have discovered what goes around will come back to haunt you as some other technological advancement is created and introduced

into the classroom. What more can I say? Shall I respond and have unlimited guidelines and tell my students, " You write until you can think of no more to say."

Does this computer era bother me? No, not really! It has made me think about establishing more computer-based technology friendly requirements for all of my projects. This is a good thing--so I am told by my colleagues. Every teacher needs to be shaken from his or her practice a little. My question is how little is little—2.5 font, or 1.5 font size?

Further Reflection

The teacher brings up a number of interesting points about computer-based technology as it relates to establishing guidelines for student's work. The narrative reflects the ongoing process of examining the guidelines each teacher takes so much for granted. What worked years ago can not so easily be applied each year, as students change, the subject requirements might change, and the goals and purpose of the assignment will also shift.

The story highlights how computer-based technology pushes us to examine the level of academics and effort required for a student to complete a project. I remember, in my own practice, a student handing me an assignment that was to be one page in length. He used about an 18 font size which filled the entire page. The dilemma came when I looked at his rough draft and realized that he had not met the minimum requirement of the assignment. His material was general and not specific, so instead of filling his paper with repetitive phrases, he had learned a new art, the art of filling the space with larger letters. Computer-based technology has allowed this to flourish, and it has become another area that directs teachers back to their practice in order to establish a more concise and computer-proof guideline for assignments. Without this guideline, the teacher will continue to face a challenge to the boundaries that a hand-printed textual world once held and took for granted.

Evaluating the Act of Greatest Flattery—Plagiarism and the Question of Authorship

Does computer-based technology challenge the teacher to deal with plagiarism more frequently?

On a more serious note than the previous narrative, one teacher shared a narrative that pushes us to examine the role of teachers as they face a very hard decision about dealing with what they perceive is a growing amount of plagiarized materials being handed in for grades. The teacher points out that many students have access to large sources of textual and visual materials and are simply taking materials off the internet without giving any thought to the aspect of authorship or plagiarism.

The discussion in the narrative became even more relevant to me when I had the occasion to personally dialogue with a fellow colleague who was asking how I would evaluate a number of assignments that obviously had the trade marks of the over exuberant parent. The context was the annual science fair, and it was obvious that in many cases the child was not involved in the process of creating the science project assignment. As my colleague told the story, he quoted one little student stating, "and my dad said, 'you stay here in the house while I work on this in the garage, and I will be back in an hour and then I will explain what your project is!'" My colleague had found the event humorous as the little guy telling the story had very little idea how he had implicated his dad by his innocent comments.

Our discussion carried on about the struggle of evaluating a student's work, especially when the delicate subject of someone else's authorship—either a sibling or parent comes into play. It is in this context that I share this account as I faced a similar situation which reflected a struggle many students have when they are faced with computer-based technology that makes copying and replication of texts so easy.

Teacher Narrative

Gail's paper had come in typed—not her usual form. The paper was orderly, well constructed, free from Gail's usual spelling errors and organizational struggles. The abundant use of words had me suspect either

she had copied much of her paper from some other source or a parent or sibling had helped guide the text to an over exuberant level.

When Gail's paper came in, I asked her how much help she had received. She indicated she had received some help from her mother, and she admitted to pulling some of her materials off the Internet. This brought to mind a number of questions: How removed from the original text was Gail's paper? Or, was the paper a reflection of an over zealous parent who wanted the best for her child, but got caught up in the zone where the shared text blurs into a mutual response project, and it is hard to determine who said what, and why it was said that way in the first place. What had this caused the disparity between her usual handwritten endeavors?

Regardless, I wondered why the gap in quality between her hand written work and her typed version of the work. It could have been remedied very easily by asking for her rough draft, unfortunately she stated she used the computer for all of her drafts and did not save any copies other than her final cleaned-up version. I was left relying on her word, not that I wanted to mistrust her record of the events, but it did show me that I needed to think of some other strategies to help me, as a teacher, to guard myself from similar doubts, and also it brought up a much bigger issue, and that is how I was going to put together some strategies to help students understand the importance of not plagiarizing another person's work, and how I needed to show them what plagiarism is and how I could build in a check to ensure that students were handing in their own original work. JE

Teacher Reflection

I realized the computer hides original authorship very easily. Handwriting is harder to hide unless a student takes time to carefully and painstakingly copy someone else's work. Many students will be found out, because it is very difficult to complete a two or three page draft without some margin of error in the copying. Computer-based

technology allows for copying without error, providing the original text is free from error. (I am not naïve. I realize that many students, unfortunately, cheat—experience has shown me this. Nevertheless it does not excuse the teacher from ignoring this issue. The teacher needs to address the issue of plagiarism and encourage students to embrace academic integrity.

With the advent of computer-generated final draft text with the availability of spelling checkers, grammar checkers and such, the teacher is faced with the struggle of originality of the work. In my friend's case, he drew attention to his concerns with the parents of the above mention student during parent/teacher interviews. From the discussion emerged some helpful insights. From now on when the gap between the printed work, and the written work is great then the teacher will call upon the student to prove the work was original by producing a record of the earlier drafts. Students are instructed that a previous draft must be saved and kept on file if they are to receive full marks in case of such a discrepancy.

Further Reflections

This teacher brings up some interesting points about the issue that faces educators in terms of plagiarism. While computer-based technology provides a vehicle to allow students easier access to a greater wealth of resources, it also comes at a price. Students often struggle to know what to do with so much resource material. Students struggle to distance themselves from the original text and must be instructed on strategies that will enable them to produce work that is their own.

Another issue is students often do not know the sources of their resource materials. In the past, I have had materials that are purely bias toward a specific ontological framework and the student has treated this material on the same level as other information not realizing the inconsistencies of the two or three ontological positions. The student also needs to be aware of what constitutes plagiarism because many are under the impression that photocopying a book is plagiarism, but copying only sections of book or pictures from the internet does not constitute plagiarism. (I remember I instructed students on the fact plagiarism

could even be understood as stealing someone else's ideas. Many students appeared puzzled and could not understand how someone else's ideas could be copied.)

In the narrative the teacher reflected upon his practice and concluded that a strategy needed to be carried through to help students make their work their own. In later discussion, my colleague suggested teachers need to ensure that students are taught to use the "save-as" command instead of relying on the "save" command when doing larger projects for academic purposes. This would allow the student to keep a running copy of the work as it progressed to the final paper. If the project was called into question then a series of copies could be given to the teacher providing a view of the growing process that writers usually follow.

The narrative also points out that even when parents and students collaborate on a student project it can be identified using a few examinations. The teacher would have to rely on the style, level of vocabulary, and other unique forms or phrases to identify the authenticity of the work. There is also the realization that the teacher cannot hope to stop all plagiarism, or academic misconduct, but can only hope to educate the student to consider personal ethical considerations as a way to guide behavior.

Evaluating the Good Looking Paper

Does computer-based technology shift the way the teacher will look at the final presentation of a project?

Overview of Narrative

The following narrative comes in response to a comment a presenter made to our staff at a seminar held at our school on the software package, "Kid Picks". In this seminar one of the presenters commented on how good the final drafts of student projects looked in comparison to the "old" way of hand drawing and coloring of title pages. As teachers later dialogued about their first impressions, they appreciated the difference of the two methods of production. Staff recognized how the computer generated title pages and reports looked a lot neater and more "published-like."

The following narrative covers a story in which the teacher reflects on the notion of evaluating the good-looking paper. The teacher points to the fact the computer-based technology is capable of helping students produce projects that appear closer to what is understood as a "published" piece of work. In computer-generated art, the work is cleaner and crisper; the margins are exact and measured; the consistency of text and highlight of titles sets it apart from hand-drawn and hand-written projects.

When you compare a computer-based technology generated title page, and place it beside a child's work that is inconsistent in the colors and shades used, has black crayon that smeared into the yellow colors, and a margin that has been framed by a pen that was running out of ink, not to mention a drawing that sort of looks like a dog, but then sort of looks like a lion also; it is not hard, at first, as a teacher, to be drawn to the cleaner, computer generated version. There seems to be no doubt that teachers are conditioned to see final drafts as published book like pieces. The closer the project resembles the publishable book format, in some cases it means higher grade rewards.

The narrative points out how computer-based technology challenges educators to reexamine their expectations and begin to determine what goals and purposes should shape and present the requirements of the project before we give it to students. Teachers must ask, how we will evaluate such materials, especially when computer generated drafts are being compared to an older technology of hand-drawn and hand written texts.

Teacher Narrative

In the last few years, more and more students are handing in computer-generated reports. I remember giving an assignment where students were asked to do a social studies title page for a specific chapter of the textbook they were working on. I left it open for students either to draw the work freehand or to use computers to generate the title page. Students worked on the project in class.

One student who has a gift for drawing began to use his abilities to create his title page. The next day I collected the title pages and especially noted the careful artwork many of the students had employed to create complete

the project. I found myself also drawn to the many students who had used computer software programs designed for professionally looking art designs. Many of the pictures that appeared on the page were obviously the work of highly trained artists, and the colors used in the pictures spoke of the quality of the color printer the student had at home. Meanwhile the text was neat, and fancy and far exceeded what children could produce by freehand. As I viewed the various projects before me, I couldn't help thinking about how much time it had taken the student who had been completing his work by hand. This was his one opportunity to shine in the class, but here and there students were remarking on the brightness and excellence of the pictures other students had brought that were computer-generated. As I reflected on disparity created by computer-based technology, I had to admit that I heard myself over and over again saying to students, "Be neat: be thorough!" Now here I was with what I had always wanted, but instead of feeling that we as a class had finally arrived, I pondered instead about how in the world would I ever evaluate the two different art forms. The two forms simply did not share a common place for comparison of the effort, quality, and creativity of the student that are often identifiable. JE

Teacher Reflection

I began to think how the criteria for grading a computer-generated project, like a title page, cannot solely rest on the student's ability to cut and paste text or images using a computer—a simple task. Evaluations should recognize skill, effort, and other qualities reflected in the work of our students. Rewarding a one minute computer-generated rushed job is no wiser than rewarding the student who quickly produces a title page which is due two minutes before class by clipping pictures out of a *National Geographic* and pasting the pictures on a white sheet of paper. While the title page created in such a fashion displays some of the best photography in the world, teachers still will question the level of effort and skill reflected in the final completed project. Simply in this case,

the student is developing very little by doing this project so hastily, and without any planning or thought to the task before them.

In terms of computer-generated materials, it appeared to me students must be challenged to develop a number of skills and prove their competency if teachers are to measure the success of a student in completing a project in which the student demonstrates a specific standard of computer skill competence. As I said before the difficulty educators have developing meaningful and skill specific projects for their students is that they often lack the knowledge to determine what level of skills produced the final computer-generated project.

What is above average for a specific age group is now called into question. The teacher must become familiar with the skill levels associated with using a computer and familiarize themselves with specific outcomes such as those provided by the province in order to establish a criteria for grading assignments that will recognize specific skills that have been either mastered by a student.

Further Reflection

A number of issues come to the surface in this narrative. It is not merely that computer-based technology should be viewed as the enemy of creativity and art. I believe teachers must begin to understand the projects that are created using the system in a different manner. The criteria for the assignment needs to be carefully communicated and designed to reflect the many levels of skills it takes a student to master the computer in order to produce the final product. In other words, teachers must begin to compare apples with apples: IBM's with IBM's—poor joke.

Teachers now have a goal to examine the many facets of computer-based technology and become aware to what it takes to produce specific outcomes. Teachers must know what to look for if they are to fairly and effectively evaluate student's work. It is this insight into teacher practice that the writer of the narrative struggled with in his classroom practice.

Evaluating the Late Assignment

Does computer-based technology shift the way the teacher will look at the lateness aspect of a project?

Overview of Narrative

In the following narrative the teacher responds to the school policy on late assignments. At MCS the policy states that teachers must record all late assignments in a special book designed to keep track of students struggling with handing in assignments on time. Late assignments are assigned a 10% docking of points for the first day late, second day is 20%, and third day 50%. Any more days late and the assignment, which still needs to be handed in, receives a zero. The policy seems straightforward in many respects, and teaching staff follows the policy without a problem, making only a few exceptions to deal with very special circumstances. The teacher points out that some students consider such a "special circumstance" when the home computer fails to print out the final draft of his or her work. The question here that the teacher deals with is whether computer-based technology failure is a sign of poor planning, or a very special circumstance.

Teacher Narrative

The other day I had a student hand me a 3-½" floppy disk containing her essay. The assignment was due that morning and she indicated that she tried to print out her assignment, but the printer would not respond. Her father, who works late, was unable to repair the printer before she headed off to school. She ensured me that she had worked very hard, and in no way could have predicted that her assignment would rest on the fickleness of the printer. She brought the disk in order that I could validate her story. A note from home also backed up her claims. I later pulled up her file using a school computer, the essay was there in completed form. I printed her essay out and included it with the other essays that were handed in that day. mre

Teacher Reflection

In the past year or so, I have been challenged to reexamine the present MCS policy relating to late assignments because of many students struggling to meet specific project deadlines due to a problem with a computer system. Part of me knows that students will make up excuses to avoid the deadline; however, in this case, I felt, students were not abusing the policy on late assignments, but felt they had a legitimate case to make. To deal with the classes concerns, I held an open forum on the subject in which the class could go over the problem of computer-based technology of failure and come up with solutions fair for all students. Students came up with the following solutions: First, it was determined by the students that a student who claims his or her computer has failed must be prepared to hand in a written rough draft of the assignment. This policy worked for the majority of cases; however, it did not work for students who usually do all their editing on the computer. Second, the students stated in the case of a student using the computer for the entire editing of an assignment, and if only the printer had failed the student was then responsible to bring in the assignment on a computer disk, and then print the assignment at school. (I found this second strategy worked very well. In 100% of cases, students who brought in a computer disk were able to print out their work without any further editing. The evidence for their claim of a computer malfunction was collaborated upon retrieval of the material on the disk.) Students also brought up one more point. If any student did not have a rough written draft or a computer disk copy, they must be prepared to receive the loss of grades according to the policy—no exceptions were to be made. It was an interesting how students came up with the solution to bring a disk. They felt the student who could not produce a disk with an earlier draft would have to accept the penalty for being late because they had failed to recognize and be unprepared for the unexpected which by the nature of computer-based systems seemed to be a standard, and not an exception.

The students indicated they fully appreciated the frailty of the machine and had become accustomed to the inconsistencies of computer-based technology. To them the machine posed the occasional problem—often more than they wanted. The sense was that steps should be taken to recognize the fragile nature of the machine and not depend on

the machine without reservation. (I found it amazing how our culture can trust computer-based technology to control so many aspects of our lives—guiding airplanes, controlling traffic, and directing and controlling nuclear arms—but as the students suggested it should never be trusted with our homework!)

The classroom discussion proved valuable as students were afforded an opportunity to address computer-based technology at a different level. Our interaction provided new insights into the machine that so many in our society have become solely dependent. What is amazing is that, given this problem with computer-based technology, students have had to learn how to organize their time around the machine. Our motto still stands, "Procrastination is still procrastination." The assignment is already late before you hit the "print" command, especially if done so three minutes before school starts.

Further Reflection

It is interesting how the teacher deals with this question. Computer-based technology equipment failure is different from other forms of technology failure the school system has had to deal with over the last number of years. If a student stated his or her pen ran out of ink and they had no alternative but to write out the final draft using a pencil, most teachers would probably not see this as much of an issue. If students stated they had no pencil and they were three days late on an assignment, we could argue that they had sufficient time to produce or borrow another pencil or pen to complete the assignment. However, when it comes to computers it is recognized computers fall into another special category.

Computer-based technology once again challenges the teacher to examine the policies that govern other technology failures for teachers tend to differentiate from a student being irresponsible to an action caused by something they could not possibly control. At least in an equitable system, I would hope a teacher would come to some reasonable grounds for the framework of the policy.

CHAPTER THIRTEEN

EXAMINING CLASSROOM MANAGEMENT STRATEGIES

The following chapter deals with classroom management which was another of the major themes that emerged from the teacher narratives. In this chapter teachers approached the subject from a number of different perspectives. Some teachers addressed the change in the atmosphere of their classrooms when computer-based technology was made available to the students. Other teachers reflected on changes they encountered in terms of classroom behavior and expectations as they entered another educational space different in many ways from the familiar setting of their own classroom. The new educational space being addressed was that of the computer laboratory. Each venue directed the teacher to reflect on his or her role as a teacher, and to review the expectations and rules they wish to establish in these different classroom environments. Many teachers indicated they noticed a difference in establishing routines, giving directions and student behavior when they were using computer-based technology as part of their teaching program. Teachers observed a number of changes in student behavior including students struggling to do individualized work, talking out loud without a sense that other students were being taken off task, and students becoming extremely agitated when things did not go right for them when using a computer. Teachers pointed out that computer-based technology creates a different tone and feel to the class. In this context, teachers reflected on their classroom management strategies and sought answers to deal with this change in the classroom environment.

* * *

The Call for Clearer Instructions

Does computer-based technology shape my classroom management practice?

Overview of Narrative

In the first narrative, the teacher observes how computer-based technology creates a need to make sure that directions for a task are given clearly and concisely. The teacher observed that the classroom goals became difficult when students were not familiar with computer language terms or familiar with the various progressions of steps to complete a specific task on the computer. The next narrative addresses the use of specific classroom management skills in communicating directions in the context of a computer class setting. In this narrative, the teacher deals with conveying instructions to students in a computer class. The teacher notes that instructions for completing a task using a

computer often have long lists of sequential steps to follow. Students who struggle to hear the teacher after routine directions are given in the classroom such as, "Get out your pens, books and paper," will struggle in a computer environment. This is due to many factors, including the number of steps required in succession to complete a simple step, and also other factors that distract the student. The teacher observes the difficulty of addressing the class when the students are focused on the computer screen, or visiting with other students in the close proximity of their computer station. When giving instructions, many teachers find students struggle to follow the steps that were given. While this can be true in any setting, teachers observed that the lack of attention during the delivery of instructions increases in a computer-based technology setting. The position and place of the teacher when helping students in a computer class is extremely important. In the narrative, the teacher discusses some of the strategies they employed in dealing with helping communicate to students in a computer laboratory setting. The final narrative addresses students who act out their frustrations with computer systems even at the point of disrupting an entire class. Once again, the teacher is faced with the issue of helping students deal with the frustrations of working with the machine, and helping students deal with the limitations of computer-systems as well as dealing with frustrations that occur because of a lack of skills on the students part.

Teacher Narrative

I was teaching using text boxes and word processing to a grade nine class. I had decided to use a resource that took the class step by step through this process. Most of the students were able to follow my directions and the directions on the worksheet. A couple of students found the directions difficult. They made the class aware of this and gave up on the assignment. Not even my help would motivate them to finish. I was frustrated and began wondering if I had chosen the best way to teach this project. I know that some directions given concerning computer assignments can be difficult to follow, even for teachers. That was my major frustration that day. I had to re-evaluate if I wanted to continue teaching that project. I don't want my students to become frustrated and

give up. I chose this story because it sticks out in my mind as one time when I felt helpless and a failure at motivating my students. I remember it because I hated feeling that way. I learned that even though some things look like they work out, there will be those times when even good planning and instruction doesn't guarantee a smooth class. (M.R)

Teacher Reflection

The narrative demonstrates the distance that often exists between the best-laid lesson plan and the eventual outcome of the plan during a class. The final comment made in the narrative is insightful and helpful, "I learned that even though some things look like they work out, there will be those times when even good planning and instruction doesn't guarantee a smooth class." In the narrative, the teacher indicated when it comes to giving instructions for a project, she can go over the project step-by-step, even use visual aids, written and verbal communications to highlight important aspects of the project and still not be sure the students received the information as it was intended by the teacher.

When having students follow instructions to work in a computer-based environment, the teacher indicates she must also take into account the confidence level of the students on computer-based technology systems, and also the student's ability to follow sequences—some students cannot follow two or three steps, and also the placement of the teacher in the classroom and the placement of students at their terminals all influence the milieu of the classroom. The teacher indicates, in telling the narrative, that she does not want her students frustrated and seeing the computer-based technology as a barrier for learning. As indicated by the narrative, computer-based technology milieu demands careful reflection and strategies to meet this challenge.

Does a Computer-Based Technology Environment Direct the Teacher to Change Strategies in Presenting Instructions to the Class?

Overview of Narrative

The next narrative also addresses the need for clarifying directions and not assuming students will understand what is being asked of them. Another important element addressed in this narrative is the process teachers can go through to mediate understanding.

In any class situation, directions can be given and a student will believe they understand what is being asked of them. The narrative points out the teacher can use follow-up questions to see if a student understands, but sometimes understanding does not come until the student actually faces a specific challenge in the steps they are following. The teacher can use these moments to discuss and mediate the next step with the student. This process builds student/teacher relationships and also brings a moment for both student/teacher to learn from the experience. Good classroom management skills allow the teacher to feel free and not threatened by this negotiation of learning space. Computer-based technology allowed the teacher another look at this important teaching practice.

In this specific lesson on the use of spreadsheets for a grade nine class, the teacher gave each student a carefully constructed project sheet with step-by-step directions. This package also included what the spreadsheet should look like; the formulas that should be entered and a number of examples of graphs the computer could generate from this spreadsheet. During the process of going over the assignment with students, the teacher noted a small error on one of the spreadsheets, but felt the error would not effect the numbers generated by the formulas in the spreadsheet. The error was in not making a specific column wide enough so that the word, "average" ended up truncated. He felt that if students followed the directions, including the column widths, the student would not replicate the error. The teacher uses the following narrative as a starting point to reflect on the process of presenting directions, being open to student struggles in not

understanding the initial directions, and then using a moment of inquiry to mediate and engage in a very "teachable moment."

Teacher Narrative

Today, during a grade nine computer class on spreadsheets, one of my students put up her hand indicating she was finished the project on the spreadsheet and wanted me to examine it before she moved on to the next step of the assignment. Her work was meticulous and well done. So well done, in fact, that I noticed she had actually copied out the entire spreadsheet as I had instructed her; but without a clue of what a spreadsheet is suppose to actually do. She had taken the original two examples from the worksheet, I had provided, and had copied them out exactly without understanding the existing relationship between the two copies: both copies showed the same spreadsheet—one copy showed the values of the spreadsheet with the formulas hidden; the other copy showed the same spreadsheet with the formulas showing and the values hidden. She had understood this as two separate spreadsheets instead of one.

When I looked at her work, I realized she had never clued in that the formulas actually were intended to calculate the values and save her vast amounts of time. She thought the two printouts were two different word processing type documents. In fact, she couldn't understand why anyone would go to such great lengths to type all this stuff out. We laughed together as I explained the relationship between the two copies I had given the class. I then took a moment to draw the entire class's attention and to further explain the misunderstanding. To my amazement a few students had also followed her way of looking at the assignment, but had not yet discovered the error.

Because she had misunderstood the relationship between the two copies, I took the time to go over in more detail her entire project. In another place on my project sheet, I had written down as a title of a column the word, "AVERAGE." During my formatting, I had accidentally

moved the width of the column too close together. The result was that the word "average" appeared similar to the following:

av
e
r

age

She interpreted that the following letters were some type of a code and she had actually taken time to replicate this error even though her column width would have allowed her to type out the word without truncating the word. We spent a few moments going over these errors, and she indicated she finally understood what a spreadsheet could do. I learned a lot of lessons that day about the confusion that can be created when I assume that my students actually understand every detail of my instructions.

Teacher Reflection

That day I learned a lot about the value of moments in teaching when a student needs to further understand directions. I remember asking students if they had anymore questions about the project after I had meticulously gone through the material. I had little student response. With computer-based technology, it appears to me, there are so many things for the student to know that sometimes they cannot ask the question until they face a problem they cannot resolve by themselves. Students not only have to know how to input materials into the computer, they must try to remember the step-by-steps needed to use the software application. Third they must also understand what the software package can do in terms of the project they are working on. In this case, the student understood the first two steps, but failed to understand how the spreadsheet was suppose to work.

Computer-based technology seems to require a new set of problem solving skills because a student must eliminate a number of possible problems before a solution can be found. In this case, the problem was out of the student's domain, and she asked the teacher to intervene. This interaction is important as it not only clarifies directions for

the student, but I have used this opportunity to tell the remainder of the class what transpired, and how we have found a solution, or need someone to tell us how they got around the problem. My role of a teacher changes in the sense that I become a mediator and facilitator to engage students in learning. I have also discovered, no matter how much I try to eliminate and predict errors in my directions, I find there are always a few that crop up because there are so many ways and options available for doing a specific project when using computer-based technology. I also recognize that in a computer laboratory setting students are also preoccupied with the computer-systems themselves. The teacher must compete with the novelty of the system, or the fact that the screen saver is blinking some message to them. After all, computers are an instrument designed to attract us, a lot of money goes into making the systems attractive, so why should I expect my students not to be lured to its Siren call. I also note that the set up of the lab often places students at close proximity to other students who always seem to have something very interesting happening on their screen. In this way communication in a computer laboratory is a challenging prospect.

What makes the work with computer-based technology very different than working through materials without the technology? The computer-based technology demands a different approach and a willingness by the teacher and the student to be flexible and willing to try new ways of approaching problems that arise. The new elements brought before the teacher and the student changes the way we must address the work before us.

Teaching as a Collaborative Experience

How does a collaborative Group Strategy Reinforce Computer-based Technology Learning?

Overview of Narrative

The following narrative is linked in content to the previous narrative. In this narrative, the teacher explores the nature of being a problem-solver. By modeling problem solving strategies to a group of students, he is able to engage his students in helping others in the class. The teacher demonstrates the flurry of activity that can exist in a computer class. His narrative reveals that as the teacher is working to solve one problem with a student needing one-on-one help, other students are engaged in solving other problems. He also notes that as discoveries are made and announced by the students other students use the opportunity to try out the solution that has been found. In this way, the computer class becomes a site of discovery and the synergy drives students to work as a team to solve similar problems in computing. In this setting the teacher must be flexible, and the students willing to take on new challenges. Computer-based technology set the stage for the teacher to examine the nature of collaborative learning, and begin to reflect on the nature of the teacher as a role model of inquiry learning.

Teacher Narrative

Another of my students was working on a spreadsheet formula assignment. She had copied the formula from my example very carefully. I even went over the material over and over again—it was flawless, yet the computer-based system failed to calculate the formula to produce the values that the original spreadsheet formula had previously produced. I searched through the menus in *Claris 4.0* and finally came across the command to show formulas. To my dismay the box was not highlighted indicating that formulas had not been entered, yet the formulas had been entered, and were entered exactly as the assignment had indicated.

The problem was compounded when three other students watching and listening to my dialogue with this student indicated they were having

similar problems. The four students how admitted they had consulted each other before they had talked to me. I concluded a similar error must have been replicated for all four students to face the same problem. I was stumped for awhile. What could be missing? Was the program messing this up? I eliminated this problem because the problem was not isolated to one computer terminal. What step had I failed to go over? I sat down beside the first student who had encountered the problem. I sat silent—thinking.

The girl behind me now struggled the get some of her material saved. She voiced her frustration to me and indicated on her computer screen was a message that indicated her disk was full and unable to save the material she had worked on so hard for the entire period. I moved from where I sat and began working on her computer. I noticed at this point that many more students were now flocked around me, with similar problems to the first one I had encountered. I was very conscious of the time being wasted, so I asked them to ignore the initial problem for now and work on another area of the assignment that this problem would not effect.

The students complied while I worked to unravel the mystery. The student with the disk error message now fought to eject her disk so she could get a blank disk into the disk drive in a hope to save her work. The problem increased while she fought with the MAC system. I could not eject the disk because the software program stated that her material was being used. How could I save her work, and figure out what was going on in the rest of the class. While working on this problem, the formula problem still loomed over us.

I was still working on the student with the full-disk error message when I noticed class time was almost over. Okay, I said to the first student with the problem with the spreadsheet. "Take out the count command in the formulas" I stated, "maybe this computer program doesn't understand this

command." With renewed hope the student carried out my plan. My three on-lookers followed the solution also. I winced as I pressed the ENTER key. I was expecting the result I wanted—no luck. I failed again.

Finally, with only a minute left in the class, I noticed the problem with the spreadsheets. I had been still fiddling with the students disk problem. Just as the resolution came to me, this student called out, "Hey, mre. You fixed it!" Sure enough, her disk slipped out and we were on our way to save her work. She was extremely happy. Meanwhile, I faced the students who were still working, and then looking my way to see if I had figured things out yet, "Girls" I called, " I figured it out!" A strange silence filled the space around me.

The problem was easy. We had all failed to place an equal sign (=) before the formula so in computer language this meant that the formula was only a text file and not a formula for the math processor to compute. With the flurry of keys, I entered the "equal" sign before each formula. Sure enough the spreadsheet software program responded as I had first predicted. I heard the clicking of keyboards around me, and each student called out as they finished the last keystroke, "Yes!" Smiles were exchanged. It was like we had conquered something very big together.

It was time to go, and once again, and as I sat in the glow of resolving a problem and keeping the class moving ahead, I realized that a computer class is something special and unique. "Clean-up! Save your work! and Shut-Down! Put your chairs back in place!" I called out.

I sit there, quietly, recounting those busy moments. It had been a good class. A busy class and not what I had planned it was a computer class. JE

Teacher Reflection

As I think of this occasion, I realize the nature of the computer class. There is a sense that we work together to solve problems. I have also found that not all problems can be solved right away, that is why I have students move on if they can. Sometimes the student will resolve the problem themselves, at other times the answer comes later. In either case the solution is shared with as many as need to know. It is like that with computers. You cannot understand some solutions if you have not had the problem yet, so you only confuse students who have not had the same problem.

My role as a teacher changes in this type of class. I move around the class, solve computer-based technology problems, dialogue with students about their work, and intervene when no work is being done. This differs from my other classes where everything follows a routine. I give directions, the students work and follow through. Questions are asked, but usually for clarification—computer-based technology seems to make me deal with problems I have not seen before. They are unpredictable. I have also found the simple steps are often overlooked, and you can never take it for granted what worked once, will always work again. I have found, as I altered my approach, I am now more relaxed in my environment. Students and teachers laugh more, and we address problems as a team rather than seeing the teacher as the purveyor of all knowledge.

Finally, I see the classroom as a busy place. It reminds me of a triage situation in which you must chose what cases are the most important for the moment. The class is a challenge, but when you do arrive at answers together the experience is like no other in terms of building teacher/student relationships and modeling for students collaborative and inquiry learning at its best.

Further Reflection

The narrative and teacher reflection points out the willingness to shift in approaches to learning that computer-based technology brings to the classroom. What stands out is the interaction and anticipation of finding solutions to specific problems. There is a synergy that develops in such a setting, as was noted by a teacher in a reflective piece about this theme.

> I have been shown through using technology in the class that learning is a life long process. Students can show the teacher just as much as the teacher can show students, if not more. I now truly believe that teachers are more or less facilitators when it comes to technology. Students are able to work with teachers, instead of for teachers. (FM)

The very process of problem solving is an important skill in the context of working with computers. Technology must be explored to find solutions to problems in specific activity designs. Thus a lesson plan might want students to learn how to use a spreadsheet, but with that is also the knowledge that learning how to use a spreadsheet also means you have to have develop problem solving skills both outside the spreadsheet—the hardware, software considerations, and in the spreadsheet—problems like entering materials incorrectly. Both levels are part of learning in a computer-based technology environment. As one teacher stated, "My advice would be to allow students to help out in teaching technology. They are usually more than willing to take center stage and will amaze you with what they can do."

Fear of Breakdowns/Classroom Disruptions/Loss of Control

What are some common fears that teachers have related to computer-based technology?

The following narratives deal with a theme mentioned by more teachers than any other. The theme that the following narratives deal with is the theme of the fear that teachers exhibited after experiences and disruptions in their class activities due to the failure of computer-based technology software materials, or hardware equipment. The narratives concern themselves with the issue of losing class time, experiencing the frustration of dealing with students who are themselves frustrated with the failure of computer-based systems, and the dependency that exists on having someone who is familiar with the computer systems enough to do the trouble-shooting the systems having to solve problems. The following are concerns that teachers expressed in dealing with this aspect of computer-based technology in their teaching experiences.

Teacher Narrative

There was a time when I was in the computer lab with a group students. They were working on projects and I was monitoring their progress. All of a sudden, three or four computers froze and other [students] had questions. I answered the questions that I could, but I could not figure out how to "unfreeze" the computers that were not working. After feeling helpless for a few minutes, one of our teachers happened to walk into the computer lab who knew a lot about computers and she fixed our computers like a pro. Thanks SR! LM

Teacher Reflection

To be honest, I am not in the computer lab very often and this was the only time that something went awry ... so it made my decision as to the selection of this story quite easy. I believe students are more technologically advanced today than they have ever been. Technology gives our students a cutting edge in society and gives them an advantage.

In some ways, learners are more advanced than adults without the technology knowledge. Teachers need to be more knowledgeable in computer technology than ever before. The background knowledge to be a teacher is more extensive. It has made teaching harder. I feel I am a beginning teacher who could use advice. Technology has made me aware that we teach in a global community. The world is not as big as we once thought it was and knowledge is much more easily accessible! (L.M)

Further Reflection

The teacher uses this narrative to reflect upon the ideology and picture of how they view computer-based technology. It is interesting to note how teachers must rely on the computer-expert to gain the confidence needed to incorporate computer-based technology into the classroom. Teachers acknowledge a group of learners are coming through the system that have a more knowledgeable background in terms of computer-

systems than the teachers there to instruct them. This presents a challenge for teachers. As the teacher who wrote the narrative indicates, our philosophy shifts about the world of the classroom. Our classroom has the potential of being a global community. This is the world we presently live in. It will influence teachers to deal with important issues in education.

The Loss of Confidence in Computer-Based Technology

Does the loss of confidence in computer-based technology shift the way teachers view their use of the system in their daily practice?

Overview of Narratives

The following narratives highlight the struggle of feeling a loss of confidence in bringing their classes into a computer laboratory, especially when they have faced, on numerous occasions, problems with the computer systems. The reliability of any technology is important to teachers. Teachers do not want to lose time to technology that fails and is unpredictable. There is a sense computer-based technology becomes a disruption of the classroom environment because an entire lesson is planned and constructed to teach the students the use of the computer-based technology equipment in the context of other learning objectives. The computer-based technology shapes the focus of the lesson: without the computer-based technology, the lesson loses purpose and a class period is lost. After losing a class period, it is obvious that teachers begin to feel the system is unreliable, and it would be better to spend class time doing some other activity. As one teacher stated when asked his main reasons for not using computer-based technology more in his classroom, he stated, "Reliability!" " I find computers used by a large group of people unreliable. They [computers systems] are also not all the same in terms of memory, speed, monitor color or black and white, etc." Reliability is an important topic to address as it has affected almost everyone who has ventured to work with computer-based technology.

Teacher Narrative One

I have faced doubt on occasion of whether I want to teach my students more about computers. This doubt or frustration comes mainly from going to the lab and having various computers not working as they should. It is impossible to teach a lesson when you have to fight with two or more computers before you start. I have had frustrations with hardware (ex. a mouse that is hooked up but does not work, printers that do not print properly or quickly, etc.). I have had frustrations with software (ex. often in Kid Pix certain techniques work on some computers and not on others). These frustrations often make me not want to take my class down to the lab and cause me to feel nervous about what is going to happen. T.D

Teacher Narrative Two

During my final practicum I was able to teach the grade four class some skills in word processing. The teachers felt incompetent in the lab and I was eager to teach. The short time spent (approximately four weeks) the students learned about font, style, point and applied these to stories they had written in LA It was successful for them and myself. It also gave the teachers some ideas to work with. I was able to spend one period with the gr. 6 class and introduced them to the database. This was more difficult, I remember. 2) When I was completing the same practicum, I had opened the computer lab one evening for parent/student conferences. It was great because the students showed their parents some of the programs they were working on. When I shut down the lab that evening, I turned off the wrong computer first and shut down, not just turned off the lab! I still have no understanding of why this occurred. When I left, they were waiting for the computer specialist to restore everything! I am still leery of computer server systems and afraid of touching the wrong key. R.O

Teacher Narrative Three

The excitement of the new computer lab was evident on their faces. Although none of the students had been there yet, the anticipation of color monitors, printers and new programs was almost bubbling over. Their peers in other classes had related how cool, neat and totally awesome the lab was. Now, as they lined up, it was their turn. Each student went to their assigned computer and took a seat. Some were teeming with joy as they looked at their full size, color monitor with sound. Others sat in disbelief as they wondered why they had to get the small, black and white, mute little Apple. The class seemed to develop into a split of have and have knots according to the computer they had been assigned. Hoping that the new software would help to bring back the excitement in all students I decided to let the kids log in. They had learned this skill last year and the step-by-step procedure I was given was going smoothly. That is, until the step-by-step procedure hit a snag. It seemed that the information provided as to how to access the particular program we needed was missing a step. The entire process was ground to a halt and a buzz soon began as the students were denied access. They all watched as their teacher struggled fruitlessly to try to access the program with his computer. The frustration levels started to climb as time passed and no one could figure out how to access. Both the teacher and the students tried everything they could think of to get things going. When it became painfully obvious that my "plans" were totally shot I thought "Hey, let's let them explore all the things their computers can do." Since this program was closed why not let them check out the others. Upon announcing my new intentions, the excitement level went up. Ten more minutes passed as the students were denied access to program after program. Frustration began to climb again and finally, thankfully, our time was up. As the students lined up to go back to class I could see their disappointment and I could hear the negatives coming out. There were the expected frowns and grumbling but what bothered me the most was a simple comment that I overheard. One student turned to her

friend and said, "I don't know how much we are going to learn about computers because it's obvious our teacher doesn't know much. A teacher's effectiveness is directly linked to their credibility and at the moment, with respect to computers, I had none. The interesting thing is that the next time we lined up for the computer lab the kids were slow, took their time and looked like they were going to a funeral. DR

Further Reflection

The narrative points to a number of important issues. The teacher says it well when he responds to the student's comment, "A teacher's effectiveness is directly linked to their credibility and at the moment, with respect to computers, I had none." The teacher points out a very important aspect about teaching, credibility. I do not think anyone would debate the importance of credibility in building the teacher/student relationship that must exist for learning to be maximized. What is interesting is how the teacher connects credibility to his ability to make the computer's operate smoothly. The sense is that this teacher, by the nature of his role, is responsible for both the subject matter, and the delivery of the subject matter in the classroom. In this case the computers failed. In terms of a few of the students, the teacher had failed also. While it could be debated other strategies need to be employed in this circumstance, nevertheless, the teacher portrays a common and honest response to a difficult experience in teaching—I am responsible for the "entire" lesson. As mentioned before computer-based technology does not always allow a quick and easy alternative. If I have booked the laboratory to teach a lesson on computer-based technology with computer-based technology and the computer-based technology fails then I am computer-based "technologyless." To be "technologyless" is a very helpless feeling.

In the next narrative, we find that computer problems are not merely isolated in the experience of the teacher, but also in terms of office administration. As the principal relates, the need to feel confident with the computer equipment is important to the overall operation of the school.

Teacher Narrative

Also this fall as Miriam continued to encounter problems with our school data, she would call MIG to get advice as to how to remedy the problem. Often, though, they really did not have workable solutions, and we seemed to be "guinea pigs" for their experiment. The most frustrating situation occurred when, due to a combination of factors, the hard drive on this computer "crashed" and had to be taken into [a Computer Store] to repair. Somehow during their "repair" all our data was lost! You need to understand that this is hours and hours of data! At this point frustration has become exasperation. Fortunately we were able to contract a computer 'expert' to restore the data from the backup data. But, that restoration process ended up costing us around $1000.00 dollars! This experience I would put under the category of 'the worst of times', and during those times I long for the simplicity of paper and pen! (L.B)

Further Reflections

There is no doubt computers that are not working properly rob educators of valuable time. The loss of massive files representing hours of work is frustrating for office staff, teachers and students and the researcher. Computer software or hardware failure directly effects the educator's response to computer-based technology. Like all societies facing technological change there is a longing at times for the way we use to do it.

Learning New Skills: Writing Possibilities

Does computer-based technology help a student to develop improved editing skills?

In the following narrative, the teacher looks at the writing process in terms of using computer-based technology to edit writing assignments.

Teacher Narrative

In one of my classes, I was collecting an assignment from my students for grading. As I looked at a number of the assignment, I noted one particular student who has used "white-out" on nearly half the sheet of paper in a vain hope to hide, or move a paragraph from where it was initially. The white-out stood out because it was lumpy and messy. The student had attempted to write on the white-out, but the text was hard to follow because the student had had to write around lumps, and blemishes left on the paper as the student had painted the white-out on. On other occasions, I have had students paste extra paper over top of whited out areas in attempt to mask a different choice the student was making in the writing process. Students have told me, that they desire to work on computers from the very beginning of their writing process because they find it is too time consuming to edit out large areas of text. On many occasions they will not do an extra edit simply because they must write out an entire story or essay to correct even one paragraph that is out of line, especially if the error comes early in the document. As I thought about this in terms of the writing process I felt that computer-based technology provided an advantage to the writer. JE

Teacher Reflection

My initial goal was to provide for my students the ability to use computers in the context of the language arts program for three specific strategies. First, I wished to have them use computers as a way to familiarize them with keyboarding so that typing skills could be developed. Second, I wanted to have students the ability to create a final presentation which was clean of spelling and grammatical elements. Third, I wanted to direct my students to creating and developing text on the computer. That is, the computer would be the agent in which they could develop writing strategies and perhaps provide them with the desire to complete a final draft not restricted by the constraints a hand-written text encumbers.

(I am thinking of students who know that their final copy contains three sentence fragments; however, for a completed final copy to be error free they must recopy the entire paper again. Many students evaluate the time and figure out that they cannot afford to re-copy the work again—frankly, they would rather lose a few marks than spend the entire evening re-copying a work.)

Thus the computer would allow them to make minor changes in text which it would be hoped would encourage some students to take the time to complete a cleaner final draft. I also thought that creating a piece of writing on the computer allows students to change, insert, and modify ideas as they come.

I would teach on strategies to enhance this possibility. For example, I would teach such things as using the "notepad" function, found in many word-processors, as a way to find an unknown word. Another function available would be to use the editing marks to show what has been deleted and added during the process of writing. Another practice could be reminding students to use the "save as" function after each class instead of the "save" commands. The "save as" function would provide students with a record of how work processed over time, whereas the "save" command updates and saves only the present record of the text without recording previous drafts.

These strategies would address the problem of editing and free students to spend their valuable time shaping and rewording their text, rather than spending time copying huge amounts of text. Computer-based technology makes this possible.

Mediating a Place for the Computer-Based Technology

How Do Teachers Mediate a Place for Computer-Based Technology in the Classroom?

Developing Motivation for Learning

The next series of narratives address the topic of motivation in learning. Teachers express in the narratives how students are influenced by computer-based technology in the classroom. The teachers express the positive side of this motivation and how they use the natural attraction they state students have toward the computer-base systems to encourage either the involvement of students with computer-based instruction or to encourage other important learning objectives, or specific behaviors.

In the first narrative the teacher comments on the excitement generated when students receive computer time. She states, "This excitement is contagious. It is a pleasure to teach happy and excited students." The narrative provides a key insight into teaching practice and stands in contrast to the previous section that demonstrated the fears that exist when the computer-system fails. In both circumstances the teacher is provided an avenue to examine what motivates students? What is an incentive? What is not an incentive for the student? Such negotiation is present in classes at any moment in the experience of the teacher.

Teacher Narrative

> The students get very excited when it's computer time. This excitement is contagious. It is a pleasure to teach happy and excited students. Recently our class has begun keyboarding. To begin keyboarding I work with each child individually explaining the home keys, and getting the students to type from home row position. It is a delight to hear the students say they can "type", and it is rewarding to me at how quickly and skillfully the students grasp new lesson objectives. I am encouraged by the student's efficiency and focussing abilities in computer class! TH

The second narrative, written by the same teacher expresses how the teacher uses computer-based instruction as a motivator to encourage student work in other areas. The computer is seen as a reward for "good work." The teacher's expectations are focused. She indicates that many students rush through their work to get to the computer-corner. The teacher includes an insightful note about her expectations, "I expect well done and polished classroom seat work. It has now become a firm rule that if the student's work is not done well, The "Computer Corner" is off limits. In following this rule the computers in our room are important learning tools." Establishing rules in the classroom for the use of computer-based instruction and integrating them into the daily routines are essential.

Teacher Narrative

> The only times I have wondered about using the computers in the classroom is when the students rush through their "seat work" to get to the

"computer corner." Although the computer programs help build learning skills, I expect well-done and polished classroom seatwork. It has now become a firm rule that if the student's work is not done well, The "Computer Corner" is off limits. In following this rule the computers in our room are important learning tools. (T.H)

The final narrative in this section also highlights the theme of the computer as a motivator. In this narrative the teacher uses the opportunity to examine classroom management, and how students' being drawn toward the computer-based technology can be motivated to carry out specific expectations in terms of social behavior when the system is used as an incentive to elicit specific behavior. There is also a sense that "time-outs" take on new meaning, especially when a student misses a learning time they love to be involved.

The Computer-based Technology as Motivator

Does Computer-based Technology help to motivate student learning outcomes?

Teacher Narrative

I realized early on that the students were intrinsically motivated to use the computer. From the moment we stepped into the computer room, I could see that they were more receptive to instruction; more willing to participate than in most classroom lessons. It became evident that a time-out from the computer period would be more effective than any other consequence when a student disobeyed an instruction or did not listen to instructions. I will use time outs from 2-10 minutes depending on the offence and the student. I very rarely have to impose a time out for any students because they want to participate. That is what I find most amazing about my computer classes. Rarely do I have the attention of each student when it is asked for the 1st time or are all students on task without once having to direct the focus of one or more students. This happens on a

consistent basis during computer class. I chose this story because of what I learned from it. I began to see that the kids experience similar feelings to my own when it comes to computers. (D.E.)

Further Reflection

In this last narrative, the teacher notes the challenge of acquiring students' attention in a computer class setting. This happens especially if the students are at the keyboard and are anticipating a chance to use the computers. Often I have discovered it is important to give directions before students sit at the terminals or take more time to ensure that they are looking at you. My rule is that students must turn and face me and their hands must be off the keyboards. The teacher also points out another valuable observation. Because students are so motivated to use the computer they will see a "time-out" from computers as the loss of a great privilege. This knowledge allowed the teacher to deal with any off-task behavior in his class quickly and efficiently. He noted that the majority of children enjoyed working with computers so he used this as a positive motivation to encourage students to complete their classroom work.

CHAPTER FOURTEEN

CLASSROOM NEGOTIATION AND COLLABORATION

In this chapter a series of narratives are presented which direct teachers to examine their thinking toward a shift in the student's role. Students are taking on the role of expert and mentor of other learners. The role of the teacher begins to shift as a facilitator who establishes and maintains a classroom climate, which allows students to freely interact with other students having the opportunities to take center stage. The new role for some teachers is difficult to facilitate as this shift demands a new way of looking at the teacher/student role. Questions of control and classroom management are called upon in this shift.

* * *

Classroom Collaboration: The Student as Teacher: The Teacher as Facilitator of Learning

Does computer-based technology shape the way students interact with other students?

In the first narrative of the series the teacher relies on the practical experience of one student and sets the stage for an exchange of knowledge from one child to another. The collaborative environment set by the teacher established a wonderful learning atmosphere in the classroom; in this classroom environment one student could help another student. The teacher was secure enough in her own teaching that she realized in the world of computer-based technology we are all learners—it is simply impossible to know every thing. As the teacher comments, "This insight made a world of difference to the child and proved to me how little I know." The key is students know this and so does the teacher. What is established is a milieu of collaborative style of learning.

Teacher Narrative

A student of mine began the year not having the hand dexterity to use the mouse of the computer. I could not begin to see why not until another student sitting nearly explained that to move the mouse across the screen, one must put the mouse at the top of the mouse pad and begin again to

draw or click where necessary. This insight made a world of difference to the child and proved to me how little I know. NH

Teacher Reflection

I chose this story to make a point that the children are still gaining knowledge whether I know everything about computers or not. I learned that I need the students maybe more than they need me in some areas. It made me feel small, but also awed at how comfortable and capable the children are. I regret and envy that I did not have these opportunities as a child.

Further Reflection

The teacher directs her thinking toward how she feels at first when a she realizes she is not the expert or the center source of knowledge for students. While the teacher knows she cannot possibly know everything, she still usually knows more than the students. That is what makes teachers the teachers and the students the students. What many teachers forget is not merely that they are the center or resource of knowledge--in many cases this is true; but teachers offer students something the student still must acquire—teachers are expert learners. By shifting the paradigm, the teacher is capable of realizing she can offer students the environment to learn how to learn. The teacher reflects this notion when she states, "I learned that I need the students maybe more than they need me in some areas. It made me feel small, but also awed at how comfortable and capable the children are." The sense is the teacher is the true model of the learner. Because they are master learners, teachers are capable of maintaining the role of teacher. Computer-based technology demands a new way to look at the role because computer-based technology is so new in terms of a common knowledge. Teachers may ultimately fail if they assume the role of expert, if they are not experts.

The second narrative in this series addresses the comfort level of the learner and the teacher as it relates to setting an atmosphere for learning. Computer-based technology brings teachers often out of their comfort zone into a place that demands the teacher to look at his or her role as a teacher in the field.

Teacher Narrative

The best day I had in the computer lab started as a huge mistake. My class needed some extra time in the lab to finish a project. I talked to another teacher and received permission to use their class lab period. My kids were all at their assigned computers when the lab door opened and a whole class of grade two kids walked in. It seems that the substitute teacher was unaware of the change. After a quick consultation with the substitute we decided to partner up the grade two kids with grade five kids. We also decided that they were to create something together. As I walked about and watched my kids "teach" their young friends I realized something. The students that I was watching were totally comfortable working on their computer. They knew how to go from program to program; they knew each program and they could explain it. However, the most important thing was that they could take a grade two student's request, developed the idea, create it, edit it, and print the idea with relative ease. As a matter of fact, I realized that they were more confident with their computer than I am with mine! At that moment I knew that these kids could function anywhere with their present computer skills. It took a mistake in planning to show how far these kids have come. What a day! D.R

Further Reflection

The teacher identifies two levels of comfort: the first level of comfort as exhibited by the students, "As I walked about and watched my kids "teach" their young friends I realized something. The students that I was watching were totally comfortable working on their computer," and the level of comfort of the teacher doing the same activity, "As a matter of fact, I realized that they were more confident with their computer than I am with mine!"

The narrative draws an important point, the teacher was willing to seize an opportunity and be flexible with the error in planning. The plan resulted in his older students being afforded an opportunity to engage with younger students. The older

students came through by demonstrating a competence on the computer-based technology systems which was beneficial for the students involved in this mentor arrangement. It is also important, how the moment stood out for the teacher as a moment to reflect on what he had not directly seen before in his class, and that is his students as young mentors. A teachable moment was born for all participants.

The final narrative in this series addresses how a team approach to learning in a computer-based technology environment provided opportunities for students to contribute to the success of other students. As the teacher recounts, many students felt the project did not challenge them so they were reluctant to carry on with the project, while other students could not complete the task because they did not have the knowledge and skills to carry out the project. When the teacher shifted her strategy and joined the two groups of students into pairs, the results were beneficial to all. The narrative provides for us the need for being flexible and negotiating a learning space for the students. In this case students were motivated to do the project, because they saw a direct investment and reward for the time they were spending by helping another student learn what they found to be easy. On the other hand, students who struggled with developing specific skills now had the one-on-one attention they needed to progress and complete the assignment.

Teacher Narrative

> This is a very short story. It probably is a successful story only because it turned out not to be a disastrous class. In our social eight class, we had a report to write on regions. But my grade eight class had many students who regularly use computers for their school work. To make them write out the report, which they told me would be a waster of time because they would simply go home and type it out anyway, simply would not work. Other students who did not have the computer knowledge were able to help other students as well. It became a team approach that worked very well. I think the students responded well because they were able to show what knowledge they had and felt that they were contributing to others. This is not a "blow you away" story, but I think it was a successful class for me and my students. M.R

Further Reflection

The key to the success in this story was the teacher's ability to read what was happening in her class. She identified specific problems that occasionally crop up in any class—students were tired of working, or trying to find another project to do that interested them more. By being flexible and moving away from a regimented program she was able to identify the problem and then address it by changing the milieu. Students who need to have a reason, a purpose for doing the work now had one. As she states, "I think the students responded well because they were able to show what knowledge they had and felt that they were contributing to others." Sometimes students needed opportunities to express their gifts. Each subject area will have stars, whether it is in math, science, French, language arts, physical education, and even computers. Students need to have opportunities to "strut their stuff!" This teacher seized a moment and it worked wonderfully.

Identifying the Speedy and Slower Learner: Establishing a pace for success in computer-based technology

How can teachers accommodate a pace for all levels of students in a computer-based technology environment?

Overview of Narrative

The following narrative addresses how students in a class represent a variety of learning styles, learning skills, and social skills, which challenges the teacher to balance the overall objects of the curriculum and the ability to tailor such demands to the need of all the students. The teacher faces students who are enthusiastic about computers, to other students who find computer-based learning a cumbersome affair. The following narrative recognizes the different place students are at in terms of the skills to use computers. In the narrative the teacher worked to develop a series of lessons to accommodate all speeds of learning so that the majority of students could acquire some measure of success.

Teacher Narrative

One of the greatest challenges I face every year is facing the challenge of developing a computer class that will challenge all of my students. I remember a number of years ago giving my grade nine students a lesson where they were to use computers to produce a business card. The business card was to be an exact size, and on the card was to be the name of a business, a business logo, and a business address with phone number included. The idea behind the project was to have students use and demonstrate a variety of what I thought were elementary computer skills. What started as a simple enough assignment turned to be a disaster in timing. I found that many students finished the project in the first twenty minutes of class, while other students were still struggling to figure out how to type capital letters. I was working with the students who had at best very limited computer skills, while the remainder of the class waited impatiently for something more to do. What I discovered was students ranged in ability from very elementary understanding of the computer system to very advanced. At that point, I felt it important to evaluate the present way I was planning my classes and find a way to accommodate different levels of computer-based technology skills.

I later designed a series of computer-generated projects that allowed students to work at their own pace. Students who wished to move beyond the minimum requirements of a project could enhance the project using the level of computer skills they had acquired. In this way, students had a freedom to move ahead if needed, or to work on a specific skill until they had mastered it. I also provided students the opportunity to help each other, in this way students supported each other and took ownership of their learning.

Teacher Reflection

When developing a computer program for a course the teacher must keep in mind that the students range in the mastery of computer and inquiry skills. Therefore, teachers need to provide a way for students to work at their own pace. The teacher must also keep in mind that they must challenge their students to move beyond the minimum requirements of a learning activity. By establishing a collaborative approach to learning in the class, the students tend to help one another solve problems they are facing. Thus, tactile, and computer knowledge skills are developed, and also problem solving skills. Students taking ownership for their learning develops a synergy in a classroom setting that encourages the entire class to move ahead in computer skill development. Problem solving builds upon inquiry skills, and offers students opportunities to build approaches to solving problems in creative ways. Thus, the teacher can deal with the multiple levels of skills that characterize a classroom of learners by shifting their focus of delivery and responding with computer projects that provide room for diversity and creativity.

This whole notion was confirmed in a discussion I had with a language teacher in our school. Teaching another language is similar to teaching with or about computer-based technology. This directed my thoughts to the important struggles prevalent in dealing with students who enter a classroom with different levels of experience. Not only do educators deal with different learning styles, they must also accommodate the learning curve in terms of time and experience. Educators face students who range from beginning levels to intermediate to advanced. One of the biggest struggles those teaching computers have is that it is hard to envision what the outcomes should be for a specific age, or grade level. Without outcomes understood by the teacher, there is no sense of direction or an establishment of goals.

In the narrative the teacher constructed a series of projects students could do at their own pace. Each project presented students with minimum requirements. If students wished to move beyond the minimum requirements, they were given opportunities to use their creativity and expand the requirements of the projects. Once students completed a project they could move to the next level of project. Each level of project was created to challenge students more and to introduce them to a number of different computer skills to complete the project. By creating this program in this fashion, students could work at

their own pace, be challenged, and always have something to work on in class. The collaborative aspects of the project recognized that the teacher saw a bigger picture in terms of developing objectives for his students. Computer-based instruction challenges teachers to move beyond merely teaching students to operate the computer-system, but also to acquire inquiry skills that help students solve problems as they use the computer-systems. Thus, recognizing the different skill and learning levels of the students does not have to pose insurmountable barriers to learning because by examining the strategies used in directing learning in a computer-based technology settings, teachers can have success.

Resource management: Working with Policy Limits

How does computer-based technology effect how one manages the classroom?

Overview of Narrative

The following selection of narratives directs us to how specific school wide policies can effect and shape the way teachers allow students to work with computers to complete specific work. The first narrative provides a look into concerns that must be addressed if the teacher is going to use computer-based technology more in the classroom. This section is not attacking the policies of the school, rather it is a reflection of the nature of teaching where the teacher is responsible to work in specific perimeters for the fair distribution of resources and the safety of children in the school.

Teacher Narrative

> I have been struggling with a problem lately that I want to resolve. Many teachers have suggested we could use a full time staff member to run the computer laboratory; however, it is simply impossible because the school has limited resources and cannot afford to hire another staff member. It is the policy of the school that all students must be supervised by a staff member at all times so this limits my ability as a teacher to allow students access to the computer laboratory outside of my computer laboratory designated times.

I find this difficult for many students are quite willing to work hard and complete a final draft for an assignment; however, the computer lab is closed to them during my language arts time. At first, I attempted to make concessions with other teachers; however, this ran into problems because teachers were not available to help students with their work and there were occasions when students took advantage of not being directly supervised. The administration worked to solve this problem by implementing a regulation that instructed teachers not to allow students into the computer laboratory without direct teacher supervision. I am not opposed to the directive because I wish to respect my fellow colleagues, but I am faced with trying to accommodate the needs of my students and the needs of the school. I am faced with limited resources and a policy that keeps my students from a valuable resource. mre

Teacher Reflection

I realize the policy exists to protect students and the property of the school. Without a formal computer laboratory staff member, we simply cannot send a student into a laboratory. It is not that the student cannot be trusted, rather it is a question of security for the student; and a preventative action plan needed until the resources can be found to hire a full-time resource person. This restriction is at times very frustrating. So often students only have a few more minutes to work on a project—usually printing out, but cannot complete the work until the next class period. This means that I must depend on students to complete their assignments at home, as the policy restricts the way students can freely get to the computer laboratory.

The restriction has caused me to shift my requirements for all computer class assignments. I now rarely recommend that students use the computer time to complete assignments because I know if they do not complete the assignments on the scheduled day there is no guarantee they will be afforded time to complete the assignment until the next computer period. The problem is assignments are given due dates with a reasonable time frame in place—to add on another week to accommodate our computer laboratories simply would not work. I guess it is clear that, while I would like to have students use

our computers to do word processing, and even though there are enough computer systems to accomplish this task, due to our limited access policy I must plan other computer projects to facilitate this limited and spasmodic availability of the computer laboratory. It is as if a huge gap exists in trying to accomplish my goals for my students in my computer class and my ability to carry out the outcomes in a way suitable to also to follow the school policy. Computer-based technology is at the center of this dilemma because the use of the technology is at the center of my objectives and one cannot teach computer-based technology with out the technology available to them.

Further Reflection

The narrative and the reflection demonstrate another element that shapes the way teachers use computer-based technology in the classroom. Strategies for planning lessons shift not only because of the availability of computer-systems, or the knowledge and comfort level of teachers, but also teachers must take into mind policies governing the use or right of use of the computer resources.

Problem of Compatibility MACS AND IBM

How does the issue of computer compatibility affect the direction of planning for student work?

Overview of Narrative

The final narrative in this section focuses on a common problem that exists in some schools when there is a problem with computer operating system compatibility. Many schools have laboratories filled with Macintosh style computers. In a recent home survey, our school discovered that the majority of computer-systems available to students at home were IBM. This meant students could bring their computer-processed assignments to school, but we did not have enough Macintosh computers with advanced features that could read IBM disks. Thus students could not continue to work on an assignment at school that they started at home or vice versa. The result was we were limited in what we could assign students to do in computer class, and students had to ensure that all work started at school must be completed at school. A very small

minority of students could transfer data back and forth because they were of the minority of home-based systems that were Macintosh compatible.

Teacher Narrative

My initial goal was to provide my students the ability to use computers in the context of the language arts on a regular basis. My goal was to integrate the use of computers in the writing process and allow student time in class to complete final revisions using the computers. However, I ran into some problems in accomplishing my goal.

First, when I took a survey of what computers students had at home in my classes, I discovered that close to ninety percent of all students owned IBM compatible computers, whereas the school's computer lab is Macintosh. This presented a number of problems: students would want to work on a final draft of a language arts project but realize that they would begin typing on a project, only to find out they could not take the work home unless they owned a Macintosh at home. At first, it was thought that we could get a software package that could fix this problem by simply translating IBM files to Macintosh files; however, after much examination and evaluation of the software required to do this, it became clear that this would not be a viable choice.

I found that I could not accommodate the majority of my students because my students opted to wait to do final drafts at home and to avoid the hassle with the incompatibility of the two different systems. What I found was when the final draft was to be worked on, students said they were waiting to do the work at home because they did not want to waste time at school simply making another draft of their work that was not really needed. mre

Teacher Reflection

As a teacher I looked at providing another avenue for my students so that they were using classroom time wisely and efficiently. (I did not want them visiting with other

students and getting the entire class off task.) To accommodate this "wait" factor, I had students work on a separate writing portfolio so that, in the event they brought a final work to completion, they could place this work aside and work on another project(s) that were at earlier stages of writing. Thus, the compatibility of computer operating systems became an issue, and has influenced the way I wanted my teaching to go.

Further Reflection

The compatibility of computer-systems shapes the opportunities teachers want to make available for their students. At MCS we are directly dealing with this issue by working toward obtaining more IBM computers for our students to use. This will help to accommodate the needs of our students as well as provide teachers with more options in planning to use computer-based technology systems in the context of their classrooms.

CHAPTER FIFTEEN

OVERVIEW OF RESEARCH DISCOVERIES

The following chapter provides a summary of research findings which consists of the encapsulation of years of observation and reflective practice as a teacher/researcher. The process of coming to the question established in my teaching career a desire to know more about how I would approach computer-based technology in my daily practice. The research challenged me to look at numerous areas common to teaching practice including: 1.) Establishing a reshaping of my view of the learner; 2.) Exploring how computer-based technology shapes the way I evaluate my students; 3.) Examining strategies for classroom management techniques in a computer-based technology setting; 4.) Exploring the changing of role of the teacher in the context of computer-based technology instruction; and, finally, Examining the changing relationship of the student and the teacher in a computer-technology-based setting. These areas that I have highlighted have made this journey fruitful and well worth the effort and time.

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A Summary of the Findings: A Place to Begin

For my colleagues and I who were involved in the study, the research provided a time to work together on a common goal; the research brought us together for another specific reason, challenged our beliefs about our teaching in a technological age, had us examine our teaching styles, evaluate our goals for our students, and helped us to shape our teaching strategies in order to be effective in our teaching profession. The journey also brought us together as a school in a collaborative effort to formulate and document our growth as educators. Thus the research revealed many paths of inquiry for the teaching staff of our school to pursue.

One of the products of this research will be the establishment of a pattern of reflective practice among the teachers, and a community of professionals willing to exact change in our daily practice. The journey became a place to examine common beliefs that shape our practice as teachers. The common ground for this examination was through reflecting upon how we use computer-based technology in our classrooms. The research also provided an opportunity for personal growth as a teacher/researcher. The research allowed numerous opportunities to reflect on my personal practice, and also to acquaint me with the work being done in the field, among my colleagues, and also in my own

teaching practice. The research pushed me to examine the teaching objectives as presented by Alberta Education and allowed me time to develop strategies to address specific concerns in my teaching practice as it related to using computer-based technology in my classroom in identifying and generating specific outcomes in learning for my students. The research also helped me to identify four specific areas of interest as it related to computer-based technology and computer-based instruction: using computers as an instrument in the writing process; examining the ethical and social implications of using computers in our society; using computers to retrieve and organize vast amounts of research data; and, finally, using computers as an instrument for in personal instruction.

The following then is an overview of the language of teachers at MCS who followed the journey to understand, evaluate, and put into practice the goals and aspirations they gathered from looking and examining their present daily practice. The language unfolded to tell the stories of teachers in daily practice. The following is a summary of our stories as told by the participants in this research project.

The Narratives

The narratives were organized into four general themes representing different areas of teacher practice: The Student Before the Teacher; Shaping a Way for Student Evaluations; Examining Classroom Management Strategies; and, Classroom Negotiation And Collaboration. The research's central purpose was to have teachers examine computer-based technology in the context of their daily experiences so that teachers would be able to identify and later address areas of concerns in their daily practice. Teachers responded by considering how daily routines, beliefs and practices were being challenged by the introduction of computer-based technology into a number of facets in a teacher's routine. These facets included: administrative work, communication and correspondence, preparation of resource materials, instruction of students in specific subject areas, and a number of other areas that will be summarized in more detail later in the summary. The narratives as they unfolded are an accurate record of the stories that brought teachers to examine their work in the context of addressing computer-based technology in their teaching.

Theme Number One: The Student Before the Teacher

Student Expectations: The Student Learning Before Us

The first theme to emerge from the teacher narratives was in the teacher's expectations of students. Teachers addressed a number of areas as it related to expectations. In the narratives on expectations, teachers considered the following question: **Does computer-based technology shift our expectations of the learner before us?** Teachers reflected upon this initial question and considered what how their beliefs and expectations about students shaped the way they worked and felt about their students.

Summary of Teacher Narratives

The first narrative focused on the quality and work ethic of the learner before the teacher, while the next narratives addressed, specifically, what expectations teachers had for students in the context of developing skills to use computer-based technology. Each of these narratives moved teachers to examine his or her beliefs about what they expected from his or her students, and also what they wanted to have students know about using computer-based technology. What came out of the narratives were that teachers generally believed that computer-based technology was beneficial for students and saw computer-based technology as a "tool" to engage and help students express creativity.

Shaping Evaluation in a Computer-Based Technology Environment

The second theme to emerge from the teacher narratives was in the area of evaluation. Teachers addressed a number of areas as it related to evaluation. In the narratives on evaluation, teachers considered the following question: **Does computer-based technology shape the way we evaluate our students?** Teachers reflected upon this initial question and demonstrated the many areas that need to be considered when formulating a way to evaluate students in the context of computer-based technology.

Summary of Teacher Narratives

Teachers Using Computer-Based Technology To Make Evaluation Easier

In the first narrative, the teacher addressed the area of how computer-based technology could be used to calculate the final grades for students. In this narrative, computer-based technology proved to be a greater task for the teacher than she had anticipated. While she still saw computer-based technology in terms of a great "possibility" her experience demonstrated how she struggled to accomplish the goals she had set out to do. The narrative also identified the isolation that many teachers feel even though avenues had been provided to help improve or support teacher practice. This narrative, while focusing on the need for teaching training, is incorporated into this section because the initial work of the teacher was focused on evaluating students used computer-based technology.

Student Evaluations: The Aspect of Fairness

In the second narrative the teacher addressed how many students who were provided with the use of computer-based technology on Grade Nine Provincial Exams over students who were not afforded the same equipment could be receiving an unfair advantage. The unfair advantage was provided because students using computer-based technology had the ability to edit their work easier than other students. A question was also raised to ask whether students could be disadvantaged by being afforded different quality and capability levels of software and computer hardware. Would evaluators also be challenged to grade papers differently? The narrative drew the teacher to consider these important questions as they related to his teaching practice.

Evaluating Context, Quality and Consistency

The third narrative examined the challenge it was to evaluate computer-based technology generated reports versus those that were created by handwriting and free-hand art. The teacher explored the notion of learning more about how to identify and articulate specific goals that were part of the steps taken to complete a specific project. The narrative drew the teacher to consider what skills were required to complete a task, and

considering how to establish a standard of evaluation for specific computer-generated projects.

Evaluating the Act of Greatest Flattery—Plagiarism and the Question of Authorship

The fourth narrative in the series explored the question of plagiarism and authorship. The narrative suggested computer-based technology has challenged the teacher to examine and instruct students on the need for academic integrity, especially, since, computer-based technology has made the availability of resource materials easier to attain, and also has given the student the ability to copy huge amounts of texts with ease. Computer-based technology drew the teacher toward this area of teaching and challenged the boundaries of easy detection.

Another interesting area that emerged was how computer-based technology had the possibility of shaping the way teachers establish project guidelines, both in terms of the length of a project, and also the aspect of due dates for the project. In both cases the teacher was challenged to articulate careful and clear directions which recognized how computer-based technology shaped those boundaries, and also to recognize the frailty of the machine.

In this section on evaluation teachers were challenged to create new directions for projects, to recognize computer-based skills, and to create marking criteria that would reflect fairness and equity for all students.

Classroom Management: The Role of the Teacher

The third major theme to emerge from the teacher narratives addressed issues about classroom management. In the narratives on classroom management, teachers considered the following question: **Does computer-based technology shape my classroom management practice?** Many teachers indicated they noticed a difference in establishing routines, giving directions, and student behavior when teachers were using computer-based technology as part of the teaching program. Teachers observed a number of changes in student behavior including students struggling to do individualized work,

talking out loud without a sense of other students being taken off task, and also students becoming extremely agitated when things do not go right.

Teachers reflected upon this initial question and considered how their beliefs and expectations about the role of the teacher and the their expectations because of the role, shaped the way they worked and felt about their classroom management in the context of daily practice, and whether this differed in a context of a computer-based technology environment.

Summary of Teacher Narratives

The Importance of Clear Directions

In the first narrative, the teacher observed how computer-based technology created a need to make sure that instructions for classroom tasks are given clearly and concisely. The teacher recognized how classroom instructions becomes more difficult when the technical language used to explain certain elements about computers is either unfamiliar to the students or the teachers, or both.

The teacher discovered some students had more confidence on computer-based technology systems than other students. Keeping this in mind helped the teacher to be careful how they sequenced the steps in giving directions. The teacher recognized some students cannot follow two or three steps, so it was important to address this concern by either reducing the number of steps, or by careful placement of the teacher in the classroom so that students could freely ask personal questions without interrupting other students who were ready to progress on with the assignment. The teachers indicated that in the process of creating a good milieu for instruction they did not want students frustrated and seeing the computer as a barrier to learning. Teachers learned that in developing a good setting for the use of computer-based technology that teachers had to identify and accommodate the different levels of understanding and learning styles of their students. Such a setting required time for careful reflection and strategies to be developed in order to meet this challenge.

A teacher also noted from the second of the narratives dealing with instructions that follow up questions play a key role to student understanding. The teacher can use these moments of follow-up questioning to discuss, and work together to mediate the next

step for the student. This process builds student/teacher relationships and also brings a moment for both student/teacher to learn from the experience.

The Changing Role of the Teacher

In the next narrative the teacher addresses how the role of the teacher changes from the role of resource person to the role of that of the mediator. The computer-based technology demanded a different approach and willingness by the teacher and the student to be flexible and willing to try new ways of approaching problems.

The narrative captures how teachers must be comfortable and confident in their teaching role, and be willing to adapt in teaching style in order to meet the needs of students. Computer-based technology sets the stage for teachers to examine the nature of collaborative learning, and helps establish the importance of professional reflective practice as a model for lifetime inquiry in the teaching profession.

The Fear of Loss of Control: The Problem of More Knowledgeable Learner

In these narratives, teachers began to reflect upon a number of personal beliefs of how they viewed computer-based technology. In the narratives, teachers point to how they must rely on a computer expert, or trouble shooter to gain the confidence needed to incorporate computer-based technology into the classroom. Teachers acknowledge that they must accept that a group of learners is coming-up through the system that have more knowledge of computer-systems than the teachers who are entrusted to instruct them. This presented a challenge for teachers.

Three narratives highlighted the teachers' struggles of feeling a loss of confident in bringing their classes into a computer laboratory, especially when they were faced with software, or hardware problems with the computer systems. Teachers pointed out the reliability of any technology used in everyday delivery of lesson materials is important to them; any breakdown of such equipment challenges the teacher to make quick changes in the delivery of information to the class. While teachers are flexible, in the case of computer-based technology a lesson solely focused on teaching students how to use the

systems requires the systems to be up and running—the sense was that an overhead projector bulb burn out does not necessitate changing an entire direction of a lesson, only the mode of delivery—a teacher can use the chalkboard. In the case of computer-based technology this simply is not the case.

Teachers indicated they do not want to lose time to technology that consistently falls short and fails them during a class. There is a sense computer-based technology often becomes a disruption of the classroom environment because an entire lesson is planned and constructed to teach the students the use of the computer-based technology equipment in the context of other learning objectives. The computer-based technology shapes the focus of the lesson: without the computer-based technology the lesson loses its purpose and a class period is lost. As one teacher stated when asked one of his main reasons for not using computer-based technology more in his classroom, he stated, "Reliability!"

Mediating a Place for the Computer-Based Technology

Teachers expressed throughout the narratives how students are influenced by computer-based technology in the classroom. The teachers express the positive side of this motivation and how they use the natural attraction they state students have toward the computer-base systems to encourage either the involvement of students with computer-based instruction or to encourage other important learning objectives, or specific behaviors.

In the first narrative the teacher comments on the excitement that is generated when the students receive computer time. As one teacher states, "It is a pleasure to teach happy and excited students." In both cases the teacher is provided an avenue to examine the aspect of what motivates students? The second narrative in the series expressed how the teacher uses computer-based instruction to foster good work habits among students. The computer is seen as a reward for "good work". The teacher established a new raule to deal with this problem. She made a condition that all work had to be done well or the "computer corner" would remain off limits to her students. By modifying the classroom rule the teacher was able to find the best mix between motivation and maximizing student learning times for her required learning objective.

Classroom Collaboration: The Student as Teacher/Peer Practice

In this series of narratives, teachers directed their reflective examinations toward their view of the student's role in the classroom. Teachers examined the difficulty of facilitating a shift in the way teachers see their present teacher/student relationships and the direction that computer-based instruction often takes them.

In the first narrative, the teacher directed her thinking toward how the teacher felt, when they realized they were not "the expert," or the center of the source of knowledge for students. Teachers stated, realistically, that they cannot possibly know everything, but the traditional role of the teacher still directs the teacher to feel confident only when they perceive they know more than their students—it is what makes them presumably the teacher, the student—the student. This traditional teacher model is challenged in a computer-based technology environment because many students, even at the younger levels, appear to be more comfortable with the computers, than teachers. (This feeling of displacement or inadequacy was pointed out by many teachers throughout the study. What teachers feeling this way needed to learn was that teachers offered to students the skill of being expert learners. By learning with their students, teachers were modeling learning first hand. Some teachers discovered this very soon and were looking at their teaching roles from a different perspective: others struggled with this concept and found the new role as being intrusive and a challenge to their authority in the classroom as a teacher.)

By acknowledging that this learning model did not displace the teacher, but established the teacher in a different role, the teacher in the narrative was capable of realizing they could offer their students an environment to learn about the process of collaborative learning. It was pointed out that computer-based technology demands a new way to look at the student/teacher relationship because computer-based technology is so new in terms of a common knowledge. Teachers will ultimately fail if they assume the role of expert especially if they are not experts in the areas that they claim to be experts.

The second narrative looked at how computer-based technology brings teachers often out of their comfort zones into place that demands they reexamine their roles as teachers. In this narrative, an older group of students were paired with a younger group of

students. The plan resulted in the older students being afforded an opportunity to engage in learning with younger students. The older students demonstrated a competence in using computer-based technology systems which was very beneficial for the younger students involved in this mentoring arrangement. In this narrative, the teacher noted his students were "totally comfortable working on their computer." The teacher also noted that success for these students demanded he step back and allow the pedagogical moment to occur. The teacher identified the students as mentors, and facilitated this through encouraging the students to take on the responsibility of mentoring younger students on the computer-based technology systems in the school.

The final narrative in this series also addressed how the team approach contributed to the overall success of a number of students who lacked the knowledge to carry out the task they had been instructed to carry out by their teacher. Students were afforded opportunities to show their expertise and help weaker students. The teacher seized what at first felt like a potential frustrating class and negotiated a very teachable moment.

Identifying the Speedy and Slower Learner: Establishing a pace for success in computer-based technology

Teachers identified how students learn computer skills at different rates and achieve at different levels. This challenged the teacher to examine how he approached teaching computer-based technology skills to students who presently range in tactile skills, and knowledge skills. The teacher was challenged with students enthusiastic about computers while still trying to accommodate another group of students who found the computer-based learning a cumbersome and unprofitable affair. The teachers modified computer-projects making them fully adaptable to the skill level of their students while still meeting the teaching outcomes as established by the province.

Teachers modified their approaches by establishing a minimum requirement for each computer project. Once a student completed a project they could move on to the next level of project. Each level of the project was created to challenge students more and to introduce them to a number of increasingly difficult and different computer skills to complete the project. By following-up on this strategy, teachers indicated a measure of success in accommodating the learning speeds of different learners.

Computer-Based Technology: The Effect On School Wide-Policies

The final narratives was directed to how specific school wide policies could effect and shape the way teachers allowed students to work with computers in order to complete specific work. The first narrative provided a look into the concerns that needed to be addressed at MCS if the teacher was going to be able to feel the freedom to use computer-based technology more in the classroom.

The narrative expressed how teachers and administration must identify areas in administrative policies that can hamper the goals of the teacher and the entire school. In this context, the teacher addressed the need for a formal computer laboratory staff member to be in place to allow a freer access to the computer labs for the students.

Without this freedom of access, students had to complete their assignments at home which created a problem in many areas of student's work at school. While the policy was in place to protect students and school property, the teacher found the policy restricted the student's ability to complete an assignment in school time.

This created a gap between what was being done at home on the computer, and the ability for the student to complete the work at school. The restrictions shaped and narrowed the possibilities teachers and students would enjoy if the policy could be addressed. Teachers recognized they daily face policies that effect their teaching environment. The narratives pointed out how teachers must identify what shapes the planning of lessons. The elements that shape the teaching environment include such things as the availability of computer-systems; the knowledge and comfort level of teachers, and also school-wide-policies which govern the access and time use of the computer resources.

Associated with this discussion on how policy can effect computer-based learning, was the realization that many schools have laboratories filled with Macintosh style computers. The narrative relayed the results of a recent home survey at the school in which it was discovered the majority of computer-systems available to students at home were IBM. This meant students could bring their computer-processed assignments to school, but we did not have enough Macintosh computers with advanced features that could read IBM disks. The end result was students and staff were limited in what they

could assign students in computer class, and students had to ensure that all work started at school must be completed at school.

Future Research Questions Arising out of the work

The narratives and reflections reflect an overview of what teachers at the MCS identified as being areas they examined in the context of their daily teaching experiences as they focused on computer-based technology in relation to their teaching. Throughout the research, questions emerged from the narratives which directed further inquiry into the area that was being addressed. This hermeneutic cycle challenged teachers to work individually (personal reflections) and collaboratively (group discussions) in order to engage in an ongoing process of growth in their daily practice.

From these cycles of hermeneutic/reflective practice came a number of emerging themes and questions, many of which were highlighted in this research; however, it must be also recognized that many of these themes and questions were still in a process of growth and will continue to emerge as the process of reflective practice continues. Many emerging questions and themes form the basis for future research in this expanding field. The questions and the themes for future research have been extracted from the data that originated in this study. The questions have been restated and organized into the four general themes representing different areas of teacher practice as identified earlier in this dissertation. The questions form the basis for future research into the use of teacher computer-based technology in teaching practice.

The Student Before the Teacher

Does computer-based technology shape our view of success in education?

The teachers narratives suggested technology does shape our view of the learner. Many teachers also indicated in their responses to technology surveys handed to them at MCS that they felt students who engaged in learning about computer-based technology and were equipped to use the technology would be able to face the challenges in the future. No doubt computers play a central role in the business world and global community. Future research could examine many aspects of this question and have

educators respond to the notion of identifying success, or the notion of success in the field of education.

Does computer-based technology shift our expectations of the learner before us?

Computer-based technology challenges the teacher to examine and to identify what they believe to be the "educated child." Our notions about what we believe to be an "educated child" in our culture will influence the direction educators develop core curriculum. What is included in such a curriculum or purposely left out of such a curriculum is directly associated to what we believe to be important in a child's development. Such a study would prove to be important and would highlight the shifts and changes that are part of developing a sense of the learner by the teacher.

Shaping a Way for Student Evaluations

How does the technology shape our strategy for grading and evaluating students?

Evaluations and grading are an integral part of a teacher's responsibility. Computer-based technology challenges the teacher to examine the way we evaluate students. A study into evaluation would help the field to grow in this area: teachers would be able to examine the basis for evaluating specific computer-based skills and be able to identify areas that set one student apart from the next student. The study could examine such issues as standardizing expectations, identifying goals for evaluating students, and helping educators to create evaluation materials for standardized testing.

Does computer-based technology provide an unfair advantage to students who either through choice, or through lack of resources who write examination or even personal work?

This research question focuses on an important ethical aspect of teaching. In terms of evaluation, students need to be provided the resources to produce the level of work they are capable of producing. An educational system that produces inequalities that favor one student over another solely on the basis of resources is failing in its mandate. Another area of research could be conducted in how educators grade computer-generated reports versus materials that are hand generated. This would make

an interesting and valuable contribution to further research in the area of computer-based technology and present student expected outcomes.

Does Computer-Based Technology Redefine the Requirements of an Assignment?

Another area for further research directs the field to examine the philosophical aspects that underlie how a computer shapes and redefines textual and visual presentations. The study would also focus on examining how teachers produce assignments that specifically address specific identifiable skills of their learners. The study could also explore how the computer-based technology compares to the way teachers have historically created lessons and assignments to address specific skills of their students. This is an important aspect of understanding the nature of technology in any civilization and an exploration of the shifts created by technology would be of great value to the field of education.

Does computer-based technology challenge the teacher to deal with plagiarism more frequently?

This research focus once again is very important in the context of the ever growing field of resources available to students. The very notion of authorship and credibility need to be examined in terms of what the future will have for academic ethics. In many ways educators are faced with an issue that is not solely a result of computer-based technology, but is forefront as educators wrestle with what appears to be growing numbers of students depending on the work of others as a way to further educational goals.

Examining Classroom Management Strategies; and,

Does computer-based technology shape my classroom management practice?

The following question could provide the basis of a very interesting focus for research. Teachers in this study indicated that they observed differences in the ways students interacted with one another and with the teacher as they used computers in the classroom. Teachers found they needed to respond differently and shape specific goals to address expectations for their class. The study would be valuable in that it would help

teachers recognize changes in their teaching environment and suggest strategies for meeting the need before them.

Does collaborative group work reinforce computer-based technology learning?

The question would direct the researcher to explore different teaching styles, teaching strategies, group and individualized student settings, and classroom spatial arrangements to examine learning milieu in computer-based technology environments. The study would be very helpful in directing teachers toward many possible strategies to engage students in optimum learning environments.

How do teachers mediate a place for computer-based technology in the classroom?

A study focused on the mediation of a space for computer-based technology would be informative for educators attempting to find a place for using computers in their daily practice. Such topics as motivation, creating computer-based learning environments, and communicating with other students outside the classroom would invite interesting dialogue and discussion for teachers.

Classroom Negotiation and Collaboration

Does computer-based technology shape the way students interact with other students?

The following research question could be the basis of understanding the effectiveness of peer teaching in a computer-based environment. Such research would also provide a view of the changing role of the teacher, and help educators to examine the teacher's role as facilitator which is becoming more prevalent today.

Other Areas For Future Research

Finally, I believe it would be beneficial to do an ethnographical study on computer culture as observed in classrooms. Since many teachers noted how students behave differently—speak to themselves when facing a screen; have trouble paying attention to directions; speak louder when responding to questions; and become

extremely possessive with the computer-equipment—it would interesting to note such shifts in behavior as a way to develop and implement strategies to address this changing culture of the classroom.

Reflecting Upon Future Training for Teachers

In a number of places, the research alluded to a common perception that teachers did not feel they received adequate training in university or colleges to prepare them to address the use of computer-based technology in teaching. A number of recommendations from the research come to mind: Computer-based technology encompasses more than merely knowing how to run the computer; future educators need to receive information on how to use computers to fulfill daily administrative responsibilities such as record keeping of grades—reading, evaluating and preparation of graphs to understand student progress, student rosters including attendance and recording student lates, seating plans, lesson plan data bases, office/classroom communications, parent/teacher communications, and teacher/teacher correspondence both in formal written hard copy style, and email for more informal correspondence, etc.

Other areas that would be helpful to address present concerns are helping educators design lessons to help instruct students in the use of computers using a variety of teaching strategies. Such lessons would include the use of word processing, spreadsheets, data-bases, multimedia presentations to name a few. Areas also needed would be helping future teachers to gain an efficiency in identifying and responding with specific teaching objectives to deal with computer-based instruction outcomes and guiding future teachers into actually planning specific lesson plans that use computer-based equipment as instruction both in individual and group learning environments.

Another key strategy would be helping future educators to design lesson plans to foster an awareness of the impact of technology on education and society. Future teachers should also be given strategies to help them prepare students to use computer-based technology in areas such as organizing data, data collection, communication with other students, and ethical considerations of using resource materials when it is hard to identify authenticity of authorship.

Finally, it would be helpful if courses for future educators would also help to develop classroom management strategies to accommodate both individual and collaborative learning environments given the uniqueness of a computer-based technology environment. Other lessons could focus on helping future teachers to develop strategies to accommodate various learning styles and learning acquisition speeds of students. Evaluation strategies for computer-generated projects and multimedia projects would also be an important area to consider. And finally a working knowledge of networks and common computer station problems faced by educators would be very handy.

Closing Historical Account of Research

At present reflective practice continues at our school among some of our staff. In review, in our first stage we identified and established a strategy for obtaining an overall picture of our school. In this stage we recorded how many teachers used computers in the school, and were presently incorporating the use of computer-based technology into their daily teaching practice. We had also looked at the availability of computer-based technology in our school, and gathered information to identify the needs of our entire constituency in order to create a workable and meaningful computer-based technology plan. By setting into place a methodology that allowed for teachers to identify areas of concerns, we were able to establish a collaborative and reflective model for helping teachers to grow in their teaching practice.

During this initial stage, the stakeholders were able to work collaboratively in an effort to identify specific needs and concerns in terms of staff and student education as it related to computer-based technology. Stakeholders were encouraged to provide a picture of the present state of computer-resources in the school and to identify areas of concerns and begin a dialogue in which important areas or concerns were identified and addressed. It is important as the research continues that the present research covers this initial stage.

After this research is over, our school will begin the next stage which will be to purchase computer-based equipment as needed, and to have in place teacher education that will deal with the specific areas addressed by educators. The school will continue to focus on the training of staff to use computer-based technology for the improvement of

practice when and where needed. The goal will be to facilitate continual dialogue and foster professional growth through collaborative meetings with staff to promote reflective professional practice. Areas such as teaming up to help one another in addressing specific concerns related to teacher practice, specific seminars addressing general computer-technology needs for the entire staff, and developing reflective practice among our staff will be encouraged.

As such, the research established a starting place for our school to enrich our practice in many ways. Computer-based technology was a beginning point for obtaining valuable teacher language. In the future this language needs to expand to all areas of interests and areas of teaching practice. In my own life, I will continue to follow the process that has lead me thus far. I look forward to the challenge.

Final Summations

Finally, I wish to encourage teachers to use this research as a starting place for your own inquiry into the use of computer-based technology in your own teaching practice. Your journey will be unique and will help you to grow in your teaching profession. The study has been valuable to me in seeing how important the teachers I work with are and how such collaborative work draws educators together to address and corporately solve common areas of concerns drawn from practice. I am reminded continually that students are our greatest work, and we must never see them as less in terms of our profession as teachers. If we are to provide for our student the best environment to learn, we must challenge ourselves to grow and model the learner before them. Teacher language toward computer-based technology offered to me an avenue of growth: It is my hope that it will also challenge you to follow hard after an area that you identify out of your own teaching experience. May your journey be as fruitful as this journey has been for me.

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APPENDIX A

I would like to participate in the following research by providing the following data.

☐ **Yes** **Comments:**

☐ **No**

The following information will be treated as confidential. The information that is collected is intended for use in this research project. If any material is needed for future publications, or reports then, I will obtain written permission from each of the contributing participants. If permission is not obtained then the material will not be used.

PART A. BIOGRAPHICAL INFORMATION

Please fill in the following information:

PERSONAL INFORMATION

Name:_____

Circle the following information that applies to you.

Gender: Male Female

Age Group: 20-25 26-30 31-35 36-40
40-45 46- 50 51-55 56-60
60-over

PROFESSIONAL HISTORY

Total number of years in teaching _____.

What grade level(s) and subject(s) are you presently teaching?

APPENDIX B

Part B: Pedagogical Technological Survey

Please read the following questions and answer them to the best of your ability. If you are not sure what a question is asking please contact the researcher for clarity. If you do not wish to answer a question leave the question blank. I thank you for your input into this research project.

1. How do you describe your confidence level in terms of using technology in the classroom?

   proficient average novice uncertain other (explain)

   Do you have a computer at home? Yes No

   What type of computer? IBM Apple (Macintosh) Other

   What kinds of software packages are you familiar with and that you presently use? (Word Processor, Data Base, Spreadsheet, etc.)

   Name of Software (include version) Use of Software

   Do you have access to the internet at home? Do you use the internet service in your preparation for your teaching? If so in what ways? (email, chat lines, research, lesson plans, games, etc.)

2. Do you use computers at school? In what capacity? Explain

3. Do you use the internet at the school? List the ways you use it.

4. Have you had any training in the use of computers in the classroom? What training have you received? Do you feel the training was adequate? Why or why not? Explain. (Include university courses if applicable.)

5. Have you ever attended an inservice that dealt specifically with the use of technology? Describe the strengths and weaknesses of the inservice. What would you like to see an inservice on.

6. As an educator what concerns if any have you isolated that would help you or to use technology in your teaching?

7. What concerns do you have before you would feel comfortable in using computers in your teaching?

8. How do you think technology integrated into your teaching practice will technology effect our vision statement?

9. Are you familiar with the Alberta Governments Technology outcomes document for your present subject, or grade level?

10. Do you feel confident to develop a series of lessons throughout the year that would produce the outcomes that the Alberta Government has identified? Why or Why not? Explain.

11. What are you presently doing in your classroom to meet these outcomes?

12. How do you evaluate your students in terms of technology use in the classroom? Please describe your strategy. What are you looking for at this time?

13. What would you need to help you accomplish this task in your teaching practice. Be specific if you can. (equipment, software, training, etc.)

14. When it comes to technology, what do you feel you want your students to know and accomplish?

15. How do you integrate faith and technology? Please take time to share your ideas.

16. Have you ever felt that parents have certain expectations for their children in regards to technology training? Has this affected your practice in anyway?

17. What would you envision to be an educated child from our school? (The question is intended to be open. Respond in any way you want.)

Please include any other information that you would like to include in this survey that would help our school understand more of your needs as a teacher. Please feel free to provide your vision of a technology plan for our school.

APPENDIX C

Part C: Narrative Writing Research Survey

We would appreciate your input into the following narrative aspect of this project. The narrative writing will give you another perspective to examine your teaching practice which will then later help other teachers to arrive at questions, share ideas, and initiate a process whereby we can all improve on our teaching practice.

Narrative writing is designed that you as a teacher are the expert, and that the knowledge you bring to the study is both valuable and insightful. You are being asked to become involved in this writing process because you have something to contribute to other teachers, and it is hoped that this experience will help you discover a way to evaluate and reflect on your own teacher practice which I believe is essential in order to grow as a professional. I wish to thank you for taking this extra time to help identifying needed areas for computer-based technology planning at our school.

What is a narrative?

Narrative writing is simply the re-telling of one of your stories as they relate to a specific teaching aspect of your practice. The narratives in this study are related to your work with teaching with technology. The narrative is to be orientated toward your personal teaching experience. The narratives simply recount what you as a teacher remember about a specific incident and what you learned from the experience. It is in the re-telling and listening to other teachers re-telling their stories that the narratives bring to the surface truths about teaching. From these themes you will discover what other teachers have been doing in their classes and how your teaching practice can help others to improve their teaching skills.

How do I write narrative?

In writing narratives you are merely going to recount the story as you remember it. (Please do not worry about multiple writing drafts.) The key is that you communicate clearly what happened and why the incident (story) addresses the question as you see it.

Narrative Research Questions

Please take some time to reflect on the following questions and write two short anecdotal stories that will address each of the following two areas (one anecdotal story for each question). The narratives do not have to be that long. The key is that the main elements of your story is made clear. After you have finished your narratives wait a few days and then read them once again. At this point please answer the reflection question after you have completed reading your story. Please keep in mind the story can be humorous or more serious. It is up to you.

1. **Story Number One**

   Write a story about an incident in your teaching profession or life in which you feel you were successful in using technology in your teaching experience. Please include the context in which the story takes place.

   Reflection: Why did you choose the story you did? What did you learn about teaching with computer technology that would help another teacher experience success also?

2. **Story Number Two**

   Write about a time in which you faced doubt to whether you wanted to continue using technology in the classroom? or Write about why you do not use computers in your classroom at this time? Please include the context in which the story takes place.

   Reflection: Why did you choose this specific story? What did you learn from your teaching experience?

Narrative Post Reflection

Has technology shaped your view of the learner? the teacher? In what ways?

What advice would you give to a beginning teacher who is concerned about integrating technology into the classroom?

Has technology shaped the way you teach in any way?

Please feel free to write on any other subject area relating to computer technology in the classroom that you have been thinking about.

I wish to thank you once again for your input into this research project/technology plan. It truly my desire to facilitate and initiate an open dialogue for you to explore your teaching practice in relation to computer-based technology. We want to make this process valuable for you. Your time is precious, and we thank you for using it to advance our understanding of our work as teachers.

Sincerely,

Researcher/Technology Project Facilitator

APPENDIX D

Teacher Language Towards Technology

Summary of Research Project

The following research project which I am asking you to be part of comes from my interest in understanding computer-based-learning in the context of my daily teaching practice as an educator. My initial interest came from my interaction with fellow teachers as we were involved a number of meetings in which our input was used in developing software for educational purposes in social studies. From these interactions with fellow teachers in the development of educational software projects, I began to have a sense that educators had specific questions that needed to be addressed as they developed and thought through how they could incorporate computer technology into their daily lesson plans. It was interesting to share what our initial beliefs and assumptions about computer-based learning was, and to later review how our initial beliefs were shaped through dialogue and the further pursuit of concerns facing each teacher in the context of his or her teaching practice. Many of our questions not only looked at how we could bring this technology into our classrooms, but also whether we needed to in order to accomplish our educational goals for our students.

My initial inquiry brought me along a path in which through personal observation, readings, and reflection on my practice I was able to examine many areas of my teaching practice. I was able to arrive at a better understanding of the needs of my students, as well as developing a sense to understanding the purpose of using computers in my classroom and moving beyond the notion that I initially believed that the computer was merely a "time filler"--a play toy? I also explored the sense of what skills did my students need to use the computer effectively and what skills did the computer develop in my students that was transferable to other areas of their academic lives. I also spent some time on looking at the responsibility of educators to understand the implications of introducing computer based technology into the classroom--what would it mean in terms of pedagogical relationships, teaching styles, etc. At this junction, it is important to state that coming to the question not only involved a subject orientation to my question, ie How can I use computers in my classroom, rather the question was also evolving in a sense of methodology of pursing knowledge. As time continued, I found myself developing skills that would frame not merely my subject area, but the process of acquiring the information I sought, and also the process in which information was acted upon and applied in my teaching practice.

It is important to understand that much of this research spans a number of years of teaching experiences, and that at the onset of the research seeing computers in the classroom was something new and at the cutting edge of educational change. What amazes me is that in the seven years since my initial interest how quick technology has changed. When I started there was little talk of the Internet--email, personal web sites, or distant education through such programs as Cyber- High. Those concepts were for the future and at the time neither the government policy makers, schools administrators, or teachers had any sense that computers in the classroom would be encouraged so quickly. Today, interactive technologies are ever more increasing exponentially and in effect calling teachers to pay attention to the growing trend.

Yet as I interact with other educators I find that many of the same questions that I began my inquiry are still relevant to this day. To my amazement I am discovering that few of these questions are being addressed. Almost like a stream that is forever growing teachers feel a pressure to conform without having their concerns addressed. I am perplexed to why they are not being addressed. Thus coming to a question has been a process for me, and as I have gone through numerous inservices on integrating computer-based-learning into my daily practice, I am still finding questions that educators are not finding for themselves. Perhaps it is because there is an assumption among many that technology is "user-friendly" "a necessity to the learned person" and everyone can see how important it is in the scheme of learning therefore teachers are asked to embrace the "way" rather than having opportunity to address the concerns that they have as knowledgeable participants in education. I believe teachers need to be afforded a process in which they may contribute to the development of a language that is centred on daily teaching practice. As new questions develop they will unfold a knowledge that is essential to developing a pedagogical understanding and context to bring technology into the daily routines of educators.

This research then is a narrative about such a process. The goal of the research is to help teachers ask and explore the questions that will help them become better educators through reflective practice and at the same time help the reader of this thesis to engage in the same process of asking important and pertinent questions as educators push the boundaries of what is known about the pedagogical influences that computer technology will bring to us as teachers. The questions will reflect strategies used to incorporate computers into the classroom, they will provide room to examine action as it is carried out and observed in the classroom; the questions will examine the nature of reflection as it also relates to the teacher's understanding of the various aspects of curriculum in daily practice and as it relates to what Schubert calls common places: teacher, student, resources, milieu. Teacher centered knowledge will provide the context of language that will address the roles, needs, concerns, and philosophical perspectives of the learner in order for teachers to become effective in what they do best--teach. The following is a record of the path of teacher language toward technology that I was involved in order to start with the question as foundational in the title of this research: What is teacher language to technology?

APPENDIX D

Overview of Collaborative Group Study

The collaborative group study will consist of two other teachers from our school, including myself as a teacher \ researcher, and one of our divisional leaders acting in the capacity as a "critical friend." The collaborative study group will include other teachers who would like to explore how they could use computer technology in their classrooms to instruct their students.

It is my hope that being involved in this process will deepen your understanding of computer technology into your daily practice, and will give you an opportunity to ask questions, share ideas, and work through a process whereby you will improve your teacher practice. This research is designed that the teacher is the expert, and that the knowledge you bring is both valuable and worthwhile. You are being asked to become involved in this research because you have something to contribute to other teachers and it is hoped that this experience will help you discover a way to evaluate and reflect on your own teacher practice which I believe is essential in order to grow as a professional. I wish to invite you to become part of this team.

I know that in order for you to be involved in this research project you will want to know what your time requirements will be and what responsibilities you will have in being part of this study. I hope that the following information will help you to address these important concerns.

Time Requirements:

The research will take place over four school months: October 98, November 98, December 98, and January 99. (The group will meet for about 1 hour twice a each month after school 3:30 - 4:30 PM.)

Participant Responsibilities:

As a participant in the collaborative aspects of this research you will be asked to carry out the following activities: 1) read this research package, and then complete the biographical research form; 2) attend an orientation meeting in which the researcher will go over the research being conducted and will address any questions that you may have; 3) in consultation with the researcher, if needed, create a number of detailed lesson plans that will be used by you in preparing your class for the introduction of computers into the classroom. 4) keep a diary in which you record observations and reflections about your teaching activities; and, 5) meet once or twice a month to review what you are doing and to discuss the various themes related to your topics. Finally, you will have to meet with the researcher near the end of the four months to validate the data which will only take about one hour of your time.

At the Orientation Meeting the following topics will be addressed:

- Overview of teacher language to technology
- Orientating the teacher to teaching practice
- Creating Lesson Plans
- Journal Writing
- Data Formats (video recordings, audio recordings, pictures)
- Planning, Observations, Reflection, Planning

I wish to thank-you for considering joining our group. Your input is valuable and the findings of this research will not only improve all our teaching, but will help other educators to develop the skills to improve teaching practice also.

APPENDIX D

MCS TECHNOLOGY PLAN

Monday, March 15, 1999

Dear fellow teacher,

We would like to thank each of you for participating in the technology development of our MCS technology planning model project. Your input into this project has been very important, as it will help MCS to create a technology model that will help us all to gain a clearer picture of our present teaching beliefs and practices as it relates to all facets of our teaching whether using technology or not in our daily practice.

We would like to remind you to follow-up on the parent/student technology surveys. We need this information so that we can ensure that future goals and training reflect the needs identified by the stakeholders at MCS.

Also, If you have struggled to get the teacher survey in by now, please submit this form by Monday, May 17, 1999. This will be your last chance to contribute to the plan. If you are not intending to contribute to this plan, please let Miss R, or Mr. E know.

Our next step will be to organize the data into a manageable format. We will let you know the findings in the near future.

Thank-you once again for your participation.

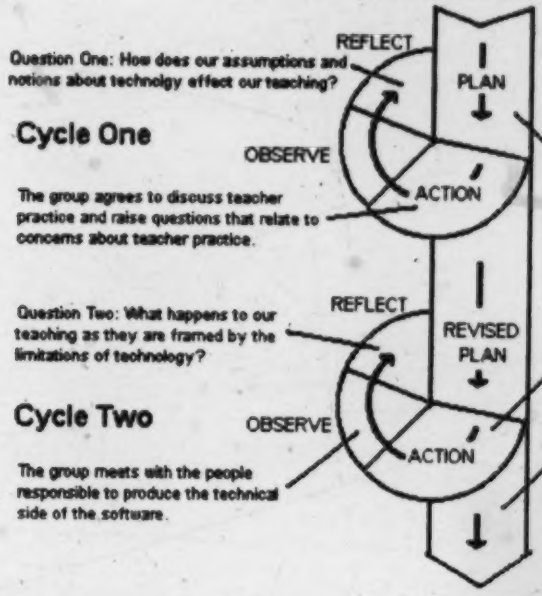
Yours truly,

Technology Project Facilitators

Appendix F

Overview of the Jean Talon Project

Adopted from Action Research Spiral (Kemmis & McTaggart, 1981)



Question One: How does our assumptions and notions about technolgy effect our teaching?

Cycle One

The group agrees to discuss teacher practice and raise questions that relate to concerns about teacher practice.

Jean Talon Project begins with the group of educators developing lesson plans to use in the CDROM interactive project.

The focus shifts from a series of concerns that arise from developing a technology that could potentially change the way teachers think about the classroom practice.

Question Two: What happens to our teaching as they are framed by the limitations of technology?

Cycle Two

The group meets with the people responsible to produce the technical side of the software.

During a production meeting the group works on developing a lesson plan that will produce a game like the "Wheel of Fortune." Problems arise in seeing the ideas incorporated into the final product.

The group observes that our creative input is influenced by the limitations of the technology and so our teaching strategies are shaped by this process.

Does technology change the discourse in the classroom?

Does technology shift pedagogical relationships?

What is my role as a teacher in the classroom?

Cycle Three

We discussed the nature of the classroom and how a teacher negotiates a specific order and system in the classroom we began to explore how the computer system itself must be negotiated by educators.

In the last few weeks we worked on the final touches of our last unit entitled, "Quality of Life" which examines the effects of technology on the lives of Canadians. The "Quality of Life" section was one of our most challenging units as many areas of teaching were explored.

This provided a vehicle which led to new discussion about our personal practice as negotiators in the classroom.

Tied close to this was the sense of dealing with controversial issues in the classroom.

Cycle Four

We also realised that if our group struggled with aspects of this technology then it was possible that many educators would also struggle in understanding and equipping themselves to use the materials in the context of their own work.

During our final days of meeting, our director gave an overview of the direction that our discussions had taken

Thus the process of observation/reflections helped me to understand the nature of my beliefs in teaching and set the framework to help me to continue my exploration of my initial question: "How does my assumptions and notions of technology effect my teaching?

Teacher Language To Technology

APPENDIX G
Teacher Language Toward Computer-Based Technology

	Teachers	Learners
Teachers	How do teachers view other teachers in this situation.? What effects does this have in terms of compromises that some teachers need to make in order to respect the rights of another? How do teachers encourage and assist one another?	Teachers sometimes use the term chemistry as a metaphor for the atmosphere created by a particular group of learners. How does the chemistry of a group of learners influence the teacher? The same teacher who is quite effective with one group of students might be quite ineffective with another. The teacher's style may not fit well with one group of students but may mesh perfectly with another. What group process techniques could improve the interactions among persons in a particular group of teachers and learners?
Learners	What aspects of learner's personalities does the teacher bring out? What aspects does he or she suppress? In what ways does the teacher model attitudes and behavior? What image of an educated person does the teacher give students? How does the teacher convey messages about what he or she considers important and valuable? What does the teacher convey is worthwhile to students?	How might one dynamic student leader among a group of learners affect other learners? What if this leader is not interested in the subject matter or does not like the teacher? How can a small group of learners attitudes affect the attitudes of other learners? Can such attitudes be used to inspire further learning? How?
Subject Matter	How does the teacher's attitude about a subject affect the subject matter? How will the teacher's interpretation of the material compare to a teacher that is enthusiastic about the material? How does a teacher broader knowledge of a subject affect his or her teaching of it?	How does prior experience with a subject area affect current learning? To what extent does prior knowledge of a subject influence learning? How will certain ideological beliefs affect the current learning of a subject area?
Milieu	How does a teacher's behavior, attitude, and general personality influence the classroom atmosphere or ambience? How might the same set of classroom rules be different depending on the teacher? How does the teacher's orientation to teaching influence the physical environment? The psychosocial environment? How much variation in the design and decor of the physical classroom setting is dependent on the teacher's outlook?	To what extent do learner attitudes, behavior, and general outlook influence classroom rules and expectations? How do these same characteristics affect the flexibility of physical use of space and materials in the classroom? In what ways do the learners influence classroom atmosphere?

The following matrix was copied from the book, Schubert, William H. (1986). *Curriculum: Perspective, Paradigm, and Possibility*. New York: Macmillian Publishing Company. London: Collier Macmillian Publishers. Pages 302-305. The word is credited to the work of Francis Bacon and the work of Joseph Schwab on the common places of teaching.

APPENDIX G
Teacher Language Toward Computer-Based Technology

	Subject Matter	Milieu
Teachers	How do materials purchased for a classroom control the type of teaching that will be done there? What kind of view of the teacher is implicit in the materials that are supported in curriculum guides, and overall policy statements about curriculum? Do the policy makers show regard for teacher's professional judgement, or do they strive to "teacher-proof" the curriculum?	How do the physical characteristics of the school and classroom support and/or hinder what teachers want to do for students? How does the configuration of desks, chairs, audio-visual, computer equipment, electrical outlets, lights affect the quality of teaching? How does the availability of materials affect the quality of teaching?
Learners	What if the subject matter required to be taught is developmentally inappropriate for student? i.e.. content has no bearing on experience of the learners? What image of knowledge is given to learners about the nature of knowledge by the way it is presented in the subject matter materials? What image of the learner is implicit in the subject matter? How are learners viewed? as learners primarily deemed active, social creators or knowledge or passive recipients of knowledge?	How do the general regulations of school buildings, the peer culture the extracurricular activities, the learning to defer gratification, the rules and regulations, the crowed conditions, the daily life agemates, the grade reports crate an ambience that affects the learners' conceptions of themselves? How does this affect their images of what the world is like and what one must do to get along in it? How does classroom life form student images of what an education is and what it can provide? How does the tenor of authority affect learner performance, attitude, behavior, and outlook?
Subject Matter	Are curriculum policy statements consistent wit curriculum guides? Do purposes and goal statements of curriculum guides fit the learning styles experiences, and do the learning experiences or content and organizational patterns facilitate purposes? Is a consistent philosophy of teaching and learning represented by different purchased curriculum materials? Across subject areas? Are these consistent with teacher made materials? With daily lesson plans? With the subject matter that evolves spontaneously through the daily interactions among teachers and learners?	Are there ways in which the rules and regulations of the classroom, the general ambience, and the physical environment resist or constrain the subject matter that is intended to be taught? Do they support and nourish the subject matter in other ways? How? What kinds of alterations in the milieu might be made to improve the acquisition of subject matter? Do particular areas of the curriculum fare better because of the milieu?
Milieu	How does the physical environment signify the nature of the subject matter taught in that environment? What kinds of rules or general modes of operation are demanded by the subject matter? What ambience or psychosocial atmosphere does the subject matter permit? How flexible are the possibilities? How constraining? Where are the purchased materials located and how are they organized for the use in each classroom? Does higher or lower quality of learning prevail because of the location, organization, and substance of purchased materials?	How do rules and regulations, physical features, and ambience of the school and individual classrooms affect each other? How do they facilitate one another and how do they clash? Within either of the classroom or school as a whole, are the rules, physical features, and ambience congruent in intent and philosophy, or are they sometimes at odds? If at odds, how might they be brought more into harmony?

The following matrix was copied from the book, Schubert, William H. (1986). *Curriculum: Perspective, Paradigm, and Possibility*. New York: Macmillian Publishing Company. London: Collier Macmillian Publishers. Pages 302-305. The word is credited to the work of Francis Bacon and the work of Joseph Schwab on the common places of teaching.

APPENDIX TT

Education Technology Planning Model MCS

The technology planning model is intended to guide participants through the process of establishing an education technology plan which will reflect the unique vision, mission, and goals of those who are stakeholders in the ministry of MCS.

Plan Components

The technology planning model will be developed through a collaboration of various stakeholders of MCS in response to the following basic components:

- technology vision/ mission statements
- assessment of needs
- establishment and articulation of specific goals in relation to the interaction and interdependence between teacher, student, subject area (integration--the sense of technology transparency), milieu
- education technology system design (connectivity)
- long-term strategies and timelines
- implementation plan (including provincial, and district planning matrix)
- anticipated results
- monitoring and evaluation plan
- budget
- on going work to keep the process ongoing and updated

Managing the Process

To assist technology planners, some general suggestions are offered here for how the chair of the technology planning committee, working in conjunction with school administrators, will guide the day-to-day functioning of planning activities. These are presented in stages; however, many of these responsibilities could best be carried out simultaneously. In general, the stages of the planning process are as follows:

Stage One: Organization of Technology Planning Process

Form a technology planning committee -- Appoint a Technology Committee. This committee will be responsible for developing the Technology Master Plan. If possible, committee members should include representation from each division in the school. Members could also include other stake holders, including specialised technology groups such as office staff, teacher support staff, and members of the board and educators focused in specific areas such as speech therapy, ESL, Special Needs Co-ordinator, and Accelerated Program Co-ordinator. The Technology Committee should be small enough to be a working group and capable of gathering information from their respective divisions to ensure a full range of

perspectives. The committee should adhere to the following organisational guides to ensure the following outcomes, open communication, edification and organisation:

- Assign tasks to committee members so their importance to the process will be enhanced.
- Form subgroups and task forces to accomplish specific goals in a timely fashion.
- Engage members rapidly in meaningful activity.
- Develop a planning and responsibility matrix.
- Establish timelines, benchmarks, goals and working procedures.
- Prepare schedules of meeting times and publish that information clearly so members can arrange their personal schedules.
- Elect or appoint a recording secretary to keep minutes of meetings. Some of this information may be published in the final planning document.
- Keep the administrator and school board in touch with the proceedings of the technology planning effort. (Go beyond simply informing administrators; seek and acquire their input and approval.)

Stage 2: Preparation for Planning

Prepare and/or refine vision and purpose statements -- Vision and purpose statements are two of the most critical parts of a written technology plan. The committee should conduct brainstorming sessions to help everyone come to a general feeling of agreement on what the school considers truly important in applying technologies to learning. A vision and purpose statement must reflect the vision and purpose statements of the Meadowlark Christian School:

Vision Statement

We believe that MCS is called by God to provide exemplary service and excellence in Christian Education.

We work with families and the community to create an education sanctuary for students to realise the spiritual, academic, and social potential.

- we desire that our students:
- understand their uniqueness to God,
- attain personal academic excellence and discipline,
- contribute meaningfully to society.

Within the MCS community, we value and support each other in the development and exercise of our educational skills and spiritual gifts.

Purpose Statement

1. To provide an environment that strengthens the spiritual development of the student.
2. To provide a learning environment where students attain to their highest level of academic excellence.
3. To provide a context where students can grow in maturity in their relationships with one another.
4. To encourage and strengthen Christian values in the home.

The final vision statement should be adopted for inclusion in the earliest part of the planning document. The same process should be conducted with regard to a purpose statement. It is essential that all committee members and all school personnel understand and can articulate clearly the vision and mission statements to the public. (This may do more to ensure successful implementation of technology than any other single activity.)

Definitions

- **vision**-articulates the broad goal or vision that the district sees for its students.
- **purpose**-articulates more closely the process that should be undertaken to achieve the vision.

Communicate *vision* and *purpose* to stakeholders--Make presentations to administration (principal and divisional leaders), teaching and support staff, parents, and students, etc.

Investigate current and emerging technologies--This step will occur before, during and after the development of the vision and mission and through out the planning process. The technology committee should plan activities to heighten members awareness of the technologies available now and on the horizon.

Identify best practices regarding education technology--This may include attending conferences, visiting other schools, school districts, reading technology related magazines, surfing the World Wide Web, etc.

Gather background information (e.g., demographic and technology-related information) about the school.

Stage 3: Assessment of Current Status

Conduct a needs assessment -- A technology survey of the stakeholders can be quite effective in determining what people need in relation to technology. Poll all school personnel including board members, administrators, teachers, teacher assistants, secretaries, students, parents, service personnel, custodians, maintenance employees, and any other pertinent school members, who will interact with technologies in any way in the context of the school. A thorough needs assessment will be an effective tool in the hands of the technology committee that can examine the compilation of needs, interpret them, and determine what specific technologies are more appropriate in various situations.

The surveys should examine skills, attitudes, and needs of participants. Be sure to include an assessment of technology support staffing needs in regards to the expansion of education technology. Needs assessment should also include an analysis of distance learning needs and reflect future educational goals of the school, including expansion plans and distance education learning needs. The assessment should also examine specific educational needs, such as special needs children, accelerated learning programs, and ESL students to name a few.

A *Technology Co-ordinator's Resource Guide* can be found in the appendix of this document, which is intended to provide assessment materials to conduct the surveys. The materials have been shaped to identify specific needs of MCS.

Conduct a technology inventory -- Technologies of all types, in all kinds of learning environments, should be quantified and also placed on a map to clearly point out present spatial relationships. Count more than just computers; include televisions, VCRs, overheads, fax machines, telephones, peripherals, networking components, telecommunications access, software, networking connections (services) etc. Consider age, maturity, present value, replacement value, and the utility of the various technologies, as well. This will give a more accurate picture of the true inventory that exists. In addition, an inventory of the human capacities (e.g., technology prowess, teacher certification levels, personal interests, and available energies) in the school will also help to provide a clearer assessment of needs.

Conduct an analysis of facilities -- Include current and future infrastructure capabilities and requirements. This, along with the technology inventory forms are an important part of the base data for the system design. Such a document would include a detailed map showing the present arrangement of lighting,

electrical boxes, and electrical outlets indicating whether they have ground fault wiring--three prong, or have a two prong system. (This will be important as systems require a lot of power needs.) Included also should be a layout of security measures as technology equipment is often a high risk area for vandalism or theft.

Examine school academic and curricular strengths and weaknesses -- Examine student performance data as well as evaluations of existing program initiatives. Determine which areas can best benefit from technology-enhanced learning. Identify current province, district, school priorities and reform efforts in terms of the goals. See Appendix Provincial Master Plan for Education Technology, Technology Outcomes and other important materials.

Review current status of professional development regarding technology skills, knowledge, and attitudes -- Evaluate the staff development program in light of the results of the needs assessment conducted in Stage 3 of the level of technology skills, knowledge and attitudes of personnel within the school. Consider also the technology standards for all teachers and identify specific areas of strengths and weaknesses. Keep this in mind for staff/professional development.

Stage 4: Goal Definition

Review, analyse, and report data -- When data is collected, the committee should examine the findings. A member or members of the committee should compile data in such a way that true analysis can occur. The committee chair should ensure that a clear, thorough report is given to the committee so all members can have a clear picture of what exists in the school prior to launching into the flurry of writing major parts of the planning document.

Define goals based on data analysis -- Goals will generally fall into six areas:

- instructional/curricular*
- administrative
- professional development*
- communication and information access*
- staffing
- maintenance/upgrades.
-

Topics or areas may be added or deleted as needed to adequately describe the goals. The three that have the (*) asterisk must be included in the plan.

Stage Five: Development of the Implementation Plan

Develop strategies and timelines for implementation -- This is the stage in which the action plan is developed. The technology committee should give careful attention to developing realistic strategies and timelines for attainment of goals. When developing this action plan, do not forget to:

- Determine staffing and training requirements. Give a description of human resources and training necessary to implement the plan.

- In developing timelines remember that the technologies need to be in place before training begins.

- Determine the schools plans for maintenance and upgrades of technology.

- ***Determine priorities and anticipated results***-- The Technology Committee must analyse existing resources, and determine priorities. In addition, the school needs to identify, in performance terms, the anticipated implementation plan results.

- ***Determine costs and prepare budget*** – Based on strategies, timelines, and priorities selected, develop budget information for the technology plan. The budget can reflect other costs that may require other sources of revenue (e.g., government grants--if applicable, donations, fund raising projects, and tuition fee factors).

- Equipment specifications should be used to assist in determining equipment costs.

- Non-allowable expenditures include personnel, supplies, etc.

Begin preparation of document -- At this stage, if it has not already begun, document preparation should begin. The committee chair should subdivide the tasks so that a maximum number of people are able to work simultaneously to compile the most meaningful document possible. Periodic meetings should be held among subcommittees to help ensure continuity and articulation of components of the plan. When the first rough draft is finalised, the committee should distribute it to the administrator and to the board. Upon approval information can be provided by the board to the staff and stakeholders of MCS. The idea is to gain feedback. This "back and forth" process can occur as many times as is necessary in order to yield a maximally effective plan.

Mount a public information campaign -- As the planning document is nearing completion, the planning committee should marshal the creative energies of various MCS community leaders who can portray to the community at large the many benefits that will accrue from an aggressive technology infusion program. The committee should arrange for presentations to inform the constituents of the work.

Stage Six: Monitoring and Evaluation

Establish monitoring and evaluation of plan -- The Technology Planning Committee should determine the process and timeline for evaluating the success of the action in the plan.

- Develop a schedule to provide for periodic monitoring of the plan's timeline, implementation schedule, etc.
- **Maintain records that will help give a clear picture of what transpires.**
- Review goals and objectives-see if changes are necessary
- Provide ongoing evaluation of the technologies, the process, the implementation, and user feedback.
- Use results of evaluation so benefits can be recognised immediately.
- Have an impartial party review your plan

Establish a revision schedule -- Plans should be reviewed by the Technology Committee and updated on a periodic basis (at least annually) based on the timeline in the evaluation plan.

Implement the Plan

When the plan is approved, implementation may begin according to the timeline in the local technology plan. A strong support system will need to be established early in the implementation phase. The implementation process is cyclical in nature, not linear. Some activities will be occurring simultaneously.

Credits: The Technology Planning Model material was condensed and reshaped from a document s obtained from the world wide internet developed by the Mississippi Educators. Other contributors included information obtained from the United States National Centre for Technology Planning (NCTP), including, *The Guidebook for Developing Effective Technology Plans* by Dr. Larry Anderson. (NCTP) which was a result of information garnered from hundreds of schools around the world. The work is available for accessing and the downloading from the WWW at http://mdek12.state.ms.us/oet/pages/psec5

APPENDIX CDROM

TEACHER LANGUAGE TOWARDS COMPUTER-BASED TECHNOLOGY CDROM VERSION

The CDROM version of the dissertation is produced as a Web Style Based multimedia presentation. The CDROM provides a hypertext pathway through the entire text of the dissertation, and also connect portions of the dissertation to other Web Sites on the Internet. Included also is a number of detailed files including some of my research journal entries, recordings of teachers' voices reading their narratives, and a number of other resources including a visual and sound representation of the settings of the school in which the research was conducted. The CDROM version also includes information on the initial stages of developing a technology plan for a school, and includes an entire section of hypertext links to the WWW (World Wide Web) which provides some examples of the readings used in this research.

Samplings Found on the CDROM version

- Samples of teacher, and researcher audio narratives.
- Hypertext links to the Internet--readings on various subjects.
- Some findings from other reports not discussed in research--purpose is to provide some information that might support or initiate new research in the field.
- Copy of final school computer based technology plan data review by staff.
- Picture files: staff of MCS, Computer Labs, Classroom settings, MCS.
- Initial reports to administration and plan for the research.
- Copy of final school computer-based technology plan--Phase One.
- The influences of the research on professional development-- samples of research diary.
- Samples of data from staff surveys.

USING THE CDROM

Hardware Requirements (Minimum)

- 486 DX System 33 with 8 Meg Ram for newer.
- Color Monitor
- 4X CDROM Reader or faster.
- Sound Card 16 bit

Software Requirements

- *Microsoft Internet Explorer 4.0* or newer. (Microsoft®Internet Explorer5.0 Copyright © 1995 – 1999 Microsoft Corporation.) **or**
- Netscape® Communicator 4.73 (Copyright © 1994-2000 Netscape Communications Corporation, All rights reserved.)

APPENDIX CDROM

RUNNING THE PROGRAM

- Place the CDROM in your CDROM READER
- Run the Internet Browser of your choice either On-Line or Off-Line. Go to the File command and choose the "OPEN" command. Use the **Browse** command to locate the files START**[Letter of Drive]**. HTM. For example, if your CDROM is designated drive "D" then use the file named **STARTD**. If "E" then use **STARTE**, and so on. Once you have found the file open the file using your Web Browser. The program will begin and you will be taken to the homepage.
- From the homepage you may now begin moving through the document like any Web Site by using the hyperlinks or the Table of Contents.
- The homepage consists of four frames. At the top left side your screen you will find a frame that gives you a choice of using either a Summary of the Table of Contents to navigate through the dissertation, or a Detailed Table of Contents. The Summary Table of Contents provides a Chapter by Chapter venue through the dissertation while the Detailed Table of Contents has all the major and sub headings to navigate from one place to another. Choose the Table of Contents that meets your needs. You can easily switch back and forth between Summary and Detailed if your need changes.
- You will also be able to navigate through the document using hyperlinks which appear in blue and change in color to a purple/pink color when used. You can also navigate by using the directional icons that are found at the end of each chapter or section.
- You can return to your original site by simply using the return arrows on your Web Browser.
- Please note that some of the icons have been hyper-linked to either sound files or specific places in the dissertation.
- Wishing you all the best in your journey. If you wish to email the researcher for more information and/or wish to provide some positive input, my email address is jpewing@hotmail.com. I welcome your input into this valuable area of research.

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All the narrative voice recordings and school pictures used in this CDROM are used with permission by the contributors and by the school where the research was conducted. The animated gifs and midi sound files were obtained from the WWW and are distributed as freeware with the expressed stipulation that they not be used for commercial purposes. This dissertation is not intended for commercial purposes and any material incorporated in this dissertation is intended solely for educational research purposes only.

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